

Pain, the Self and Persistence in Problem Solving

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The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others

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ABSTRACT

Research has suggested that people are motivated to achieve their hopes for the future (hoped-for self) while trying to move away from that which they fear becoming (feared-for self). In chronic pain populations, however, these hopes and fears become heavily dependent on the presence of pain. Research has suggested that there is a relationship between psychological distress and persistent attempts to remove pain in order to move away from one's feared self (Wells, 2010). However, little is known about the relationship between the hoped-for self and persistent attempts at pain removal. The purpose of this research is to replicate the research of Wells (2010), adding to this work by exploring the relationship between persistent problem solving and the hoped-for self. An additional aim of the research was to further explore the use of a relatively new measure of scenario-based problem solving, the *MEPS for Pain*.

Sixty chronic pain patients were recruited from one pain clinic in Leeds. Participants completed measures of pain disability (PDI), pain acceptance (CPAQ), pain intensity (VAS), feared self interview, hoped self interview and previously used measures of problem solving attitudes (PaSol) and scenario-based problem solving (*MEPS for Pain*). Participants also completed the *MEPS for Pain*-PPS a new measure of personal problem solving.

Assimilative problem solving attitudes were significantly negatively correlated with feared-for self proximity but not enmeshment when using the PaSol, and did not correlate with any of the *MEPS for Pain* problem solving scales. Assimilative problem attitudes were significantly correlated with hoped-for self proximity and enmeshment when using the PaSol, but did not correlate with any of the *MEPS for Pain* problem solving scales. Assimilative problem solving as measured by the *MEPS for Pain*-PPS was correlated with hoped-for self enmeshment, but not with hoped-for self proximity or feared-for self proximity or enmeshment.

The results suggest a relationship between feared-for and hoped-for self variables and problem solving attitudes as measure by the PaSol, however show no relationship with chronic pain patients scenario-based problem solving attempts. The implications of these findings are explored, limitations highlighted and areas of future research suggested.

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ABBREVIATIONS

ACT	Acceptance and Commitment Therapy
COWA	Controlled Oral Word Association test
CPAQ	Chronic pain acceptance questionnaire
FGA	Flexible Goal Adjustment
HADS	Hospital Anxiety and Depression Scale
ICC	Intraclass correlation coefficients
M	Mean
MEPS	Means-End Problem Solving
MEPS <i>for Pain</i>	Means-End Problem Solving for Pain
MEPS <i>for Pain</i> -PPS	MEPS <i>for Pain</i> -Personal Problem Solving
MOL	Method of Levels
ns	Non Significant
PaSol	Pain Solutions Questionnaire
PCT	Perceptual Control Theory
PDI	Pain disability index
SD	Standard Deviation
SDT	Self Discrepancy Theory
TGP	Tenacious Goal Pursuit
VAS	Pain Visual Analogue Scales

CHAPTER 1: INTRODUCTION

Pain is defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (International Association for the Study of Pain, 1986, p.217). While this definition is supportive in conceptualising the pain experience of those suffering acute injury, it becomes problematic when used to describe chronic pain. Chronic pain is defined as “pain that persists beyond the normal time of healing” (Verhaak, Kerssens, Dekker, Sorbi and Bensing, 1998, p.231). However, this definition has been criticised as it explains little of what “the normal time of healing” is and as a result research in this field has employed varying definitions of pain durations ranging from one month to over six months (Verhaak *et al*, 1998). Such definition variation has affected the ability to estimate the prevalence of chronic pain in the general population. Verhaak *et al*. (1998), in a review of the literature, reported that the prevalence of chronic pain varied from 2% to 40%, with a median of 15% being observed across the fifteen studies reviewed. Methodological issues were cited as key to this variation with Verhaak *et al*, (1998) observing that studies using a self report methodology yielded a lower prevalence rate (7%) than those utilising a diagnostic approach (40%). Although the reasons for the discrepancies between self and diagnostic reports were unclear, it could be that the methodology used in some studies may account for this, with postal and telephone surveys yielding lower participation and lower prevalence rates than direct interviews. The role of psychological distress in heightening the experience of pain was also observed in the studies reviewed by Verhaak *et al*, (1998), making the assessment of the symptoms of chronic pain difficult, as pain and mood were often observed to overlap. As a result of these observations, the authors have argued for more epidemiological research to be conducted in this area.

Despite the difficulties identified with definition and prevalence, it has been noted that pain has a psychological impact. Morley (2008) argued that pain has a number of psychological consequences in key areas of functioning, namely: interruption, interference, and identity. Eccleston and Crombez (1999) argued that

pain interrupts attention, resulting in the employment of an escape response in order to manage pain, and is evolutionary in nature. The consequence of this shift in attention towards pain is interference, as priority is placed on dealing with the pain, compromising an individual's ability to undertake daily tasks and engage in wider life goals. In the case of chronic pain, the continuation of the pain stimulus may then impact on an individual's sense of self identity. Morley (2008) suggested that the continued experience of pain, without a solution, impacts on an individual's sense of what they can do and what they can become in the presence of pain.

Romano and Turner (1985) noted that depression rates in chronic pain populations are high. In their literature review, they observed prevalence rates of depression ranging from 5.8% to 100%. However, there are a number of methodological issues which limit the ability to make interpretations about the association between depression and chronic pain. Romano and Turner (1985) indicated that studies have used varying methods of assessing both depression, and pain, with few using diagnostic criteria. This makes comparisons across samples problematic. It has also been noted that the assessment of depression in patients experiencing pain is problematic, as many depression measurements, including diagnostic criteria, assess somatic symptoms. For example, as sleep difficulties, and lethargy are commonly present for those in pain the presence of depression in chronic pain populations may be overestimated. This variety may result from a number of differing factors impacting on the presence and duration of both pain and depression, in terms of pain severity, treatment received, and prior vulnerability to depression.

Banks and Kerns (1996) support the observations of Romano and Turner (1985) observing rates of depression within chronic pain populations to be between 30-54% compared to a rate of 5-17% for the general population. Banks and Kerns (1996) argue that while the temporal relationship between depression and chronic pain is difficult to establish, the experience of pain may act as a significantly different and powerful stressor, resulting in a greater propensity for negative thoughts about self, the world, and the future, which, they argue, is likely to result in a greater potential for depression.

It seems clear from the literature that there is no single model of pain and depression, with some authors arguing that there may be other factors which influence the relationship between the two. Faucett (1994) for example, argued that relationship conflict may influence both the pain and depression a patient experiences. In a study of patients with arthritis and myofascial pain disorders, Faucett (1994) observed that mood severity was associated with pain related conflict in close relationships, irrespective of pain severity or pain disorder. Despite the lack of a single model of pain, and mood, Romano and Turner (1985) argued that the presence of depression can adversely impact on treatment outcomes. Research therefore demonstrates that, although the causal relationship between depression and chronic pain is difficult to establish, there is a clinical need to address depression as a means of improving treatment outcomes.

Unlike depression, the presence of anxiety in chronic pain populations has received less attention in the literature. McWilliams, Cox, and Enns (2003), noted that like depression, the presence of anxiety disorders in chronic pain populations can impact upon treatment outcomes. Authors have called for more research and argued for better screening of anxiety disorders in chronic pain populations, especially given the association between anxiety and pain-related disability.

Catastrophizing is a cognitive process associated with excessive worry and is commonly observed in patients who experience pain (Richardson, Ness, Doleys, Banos, Clanfrini, and Richards, 2010). Catastrophizing increases the chronic pain patient's experience of distress, as catastrophic thinking results in an attentional bias towards pain, further interfering with the patient's ability to achieve daily tasks and goals (Crombez, Eccleston, Baeyens, and Eelen, 1998). Vowles, McCracken, and Eccleston, (2008), argued that catastrophizing has a strong association with pain disability, pain intensity, and overall distress. Vlaeyen, Kule-Snijders, Boeren, and Van Eek, (1995), propose a model of pain related disability where the presence of catastrophizing increases an individual's fear of pain following injury. The resulting increase in fear of possible future pain, results in activity avoidance which further increases disability over time. Cook, Brawer, Vowles, and Turner (2006), have supported this model with a sample of 469 chronic pain patients, observing that

catastrophizing was a strong predictor of disability and depression. Jensen and Romano (2000), however, observed that catastrophizing predicted levels of depression but not self assessed pain disability in a sample of 169 chronic pain patients.

These research findings demonstrate that an individual's pain experience is multifaceted and can be extremely distressing, impacting upon their thoughts, feelings, and behaviour. As a result, a great deal of research and clinical focus has been placed on the physical and psychological management of chronic pain.

1.2 Problem solving

A problem is defined by D'Zurilla, Nezu and Maydeu-Olivares (2004, p.12) as "any life situation or task (present or anticipated) that demands a response for adaptive functioning but no effective response is immediately apparent or available to the person or people confronted with the situation because of the presence of one or more obstacles". A solution is defined as "a situation-specific coping response or response pattern (cognitive or behavioural) that is the product or outcome of the problem solving process when it is applied to a specific problematic situation" D'Zurilla, *et al*, 2004, p.13). Problem solving is defined as a process which "makes available a variety of effective potential response alternatives for dealing with the problematic situation and increases the probability of selecting the most effective response from among these various alternatives" (D'Zurilla and Goldfried, 1971, p.107). However, one difficulty with this definition of problem solving is its assumption that there are always alternative solutions available. D'Zurilla *et al*. (2004, p.13) argue that in order for a solution to be effective, the solution will be achieved by either "changing the situation for the better or reducing the emotional distress that it produces".

D'Zurilla and Nezu (1999) argued that problem solving comprises two elements; problem orientation and problem solving skills. Problem orientation were defined as "a meta-cognitive process involving the operation of a set of relatively stable cognitive-emotional schemas that reflect a person's general beliefs, appraisals, and feelings about problems in living, as well as his or her own problem-solving" (D'Zurilla *et al*, 2004; p.14). Problem orientation were divided into two approaches;

positive and negative. Problem solving skills are defined as “the cognitive and behavioural activities by which a person attempts to understand problems and find effective “solutions” or ways of coping with them” (D’Zurilla *et al*, p.14). Problem solving skills were divided into three categories; rational, impulsive/careless, and avoidant. Using these, D’Zurilla and Nezu (1999) developed a five-dimensional problem solving model as shown in Figure 1. This model proposes that those who are positively problem orientated utilise rational problem solving skills and are therefore more effective than those who are negatively orientated and rely on impulsive/careless, or avoidant styles of problem solving. The model also proposes that should initial attempts to solve a problem be ineffective those utilising constructive problem solving components are more likely to return to the problem solving process to find an alternative, whereas those who are dysfunctional are likely to give-up. D’Zurilla *et al*. (2004) argue that when applied to a chronic health condition, constructive problem solvers change the focus of the solution to one that minimises/manages distress and maximises other areas of life. In comparison, dysfunctional problem solvers give-up and seek the help of others to achieve a solution. When applying this to chronic pain populations, this would mean engaging in pain management while maximising other life goals, compared to continued attempts to access professionals to remove pain, and giving-up.

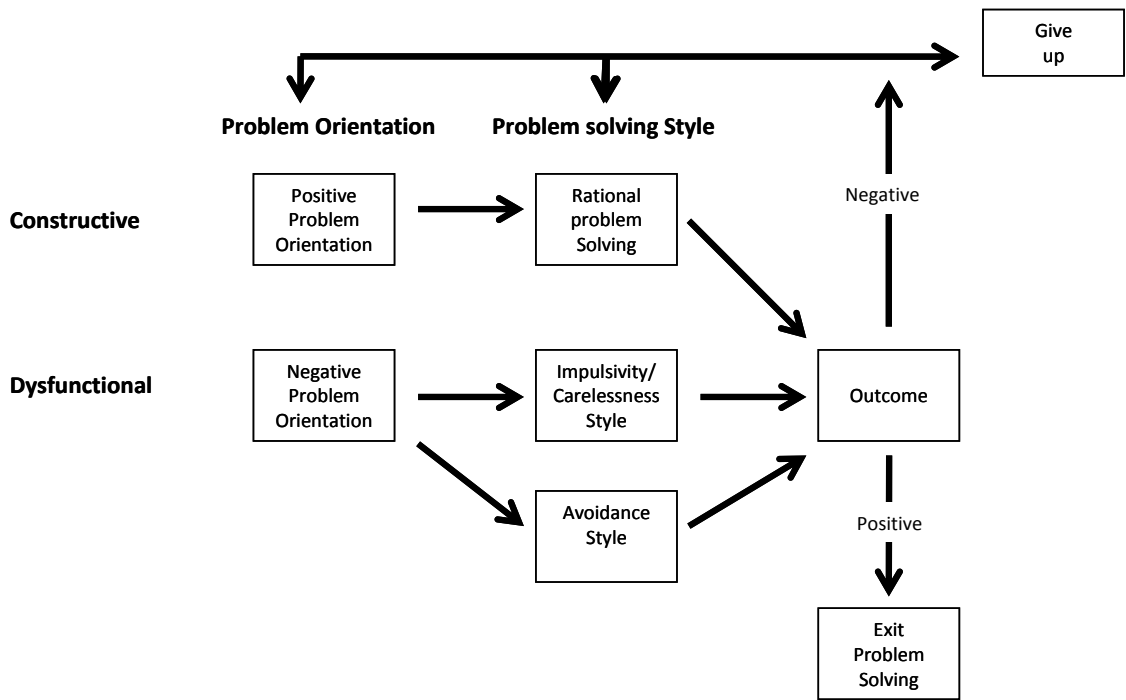


Figure 1 Social problem solving process as conceptualised by D’Zurilla, Nezu and Maydeu-Olivares (2002). Redrawn from D’Zurilla *et al.* (2004).

1.2.1 Problem solving in chronic pain

Within the chronic pain literature, researchers have conceptualised the process by which patients attempt to solve the unwanted impact of pain in terms of coping styles. Brown and Nicassio (1987) suggested a distinction between active and passive coping styles. Active coping styles are seen as adaptive and involve the patient making attempt to manage their pain, or continuing to function despite the pain. Passive coping styles are seen as maladaptive and involve relinquishing control over the pain and allowing pain to interfere with daily living activities. When exploring the dichotomy between adaptive and maladaptive approaches in a sample of 361 patients, Brown and Nicassio (1987) found that those who employed an active approach, were less depressed, had a greater sense of self-esteem, and a greater sense of control over their pain, compared to the passive group. These findings suggest that when working with clinical populations, active strategies

should be promoted. However, what remains unclear is the extent to which active coping continues to be adaptive in the absence of a pain solution.

Dysvik, Natvig, Eikeland and Lindstrom (2005), applied the transactional model of stress and coping to chronic pain. Coping responses were divided into emotional focused and problem focused coping strategies. Emotional focused coping is viewed as controlling or reducing distress in situations where nothing can be done, whilst problem focused coping is viewed as finding alternative solutions where change is possible. It was observed that chronic pain patients experienced a number of life stressors, and applied different approaches depending on their appraisal of the stressor experienced. For those who saw the stressor as a challenge, problem focused coping was employed, whereas emotional focused coping was used when stressors were perceived as threatening. Those applying emotional focused coping approaches were observed to be more depressed and had poorer self-esteem. However, what is unclear from Dysvik *et al's* (2005) work is the extent to which patients saw the presence of pain as interfering with their ability to manage these life stressors and the connection between coping responses, life stressors and the potential threat of pain.

1.2.2 Misdirected problem solving and acceptance

Some commentators have argued that there are a number of conceptual problems associated with problem solving, arguing that it is often applied as a blanket concept to either behaviour in response to pain and/or action which reduces pain, causing confusion within the literature (McCracken and Eccleston, 2003). McCracken and Eccleston, (2003) argue that some approaches to pain, as suggested in the literature, can be problematic as they serve to enhance distress in the long term. The main argument for this is associated with an individual's continued attempts to solve an unsolvable problem, as is the case with chronic pain. The authors argued that there is a need to acknowledge that the continued application of problem solving approaches without a solution can lead to depression, and difficulties adjusting to illness. This has been observed by others, for example, Eccleston and Crombez, (2007) argued that continued problem solving in the absence of a solution has a psychological impact; locking the individual into a

continuous loop of ineffective problem solving referred to as “misdirected problem solving” (Eccleston and Crombez, 2007, p.234). In such instances, a patient’s continued effort to solve their pain prevents alternative strategies and goals from being explored. Thus, distress occurs as the focus remains upon removing pain, to the detriment of exploring and achieving alternative life goals. McCracken and Eccleston, (2003) therefore highlight the importance of accepting chronic pain. Acceptance in chronic pain is defined as “living with pain without reaction, disapproval, or attempts to reduce or avoid it” (McCracken and Eccleston, 2003, p.198). Therefore, the focus is no longer on the removal of pain, but engaging in life goals in spite of the pain. The question of how one achieves a level of acceptance, however, remains difficult to conceptualise.

1.2.3 Activity engagement and acceptance

Lethem, Slade, Troup and Bentley (1983, cited in May, 1991) argued that pain involves both sensory and psychological components. They propose that the psychological component of pain is best viewed as a “fear of pain” (May, 1991, p.220) and that through activity avoidance the patient is unable to monitor the sensory reductions in pain as activity is increased. Avoidant behaviours are, therefore, perceived as protective, as activity is thought to be associated with greater levels of pain. Activity avoidance in the absence of further pain creates a cognitive-behavioural loop which serves to reinforce the avoidance of activity. This conceptualisation of chronic pain has been described within the literature as the fear-avoidance model and has received a great deal of research attention (Linton, Vlaeyen, and Ostelo, 2002). Given this model, treatment approaches which serve to increase patient activity levels in spite of pain may support a greater adjustment to illness and therefore the patient pain acceptance.

McCracken and Samuel (2007) explored activity engagement in a sample of 276 chronic pain patients. They looked at both the level and pattern of activities aiming to categorise different types of activity engagement and its subsequent impact on functioning. The study observed that patients who engaged in higher levels of activity, whilst employing fewer avoidance strategies, demonstrated better

physical and emotional functioning. As predicted by the fear-avoidance model, patients who predominantly employed avoidance strategies experienced greater disability and distress. From these findings, McCracken and Samuel (2007) suggest a link between activity engagement and chronic pain acceptance. However, this casual inference has been shown to be problematic, as activity may not, in and of itself, indicate acceptance despite the improvements in both observed functioning and distress.

Nicholas and Asghari (2006) explored acceptance and activity engagement in 271 chronic pain patients. A number of assessment measures were employed in the study including; pain intensity, disability, activity engagement, mood, and pain self efficacy (i.e. a patient's belief that they could accomplish activities in spite of pain). The results indicated that activity engagement was a significant predictor of mood, while pain self efficacy was a significant predictor of physical disability. The authors concluded that activity engagement is a better predictor of emotional adjustment than functional adjustment, with functional adjustment being defined as "a person's belief in their ability to function despite pain" (Nicholas and Asghari, 2006, p.278). This definition is similar to the definition of acceptance proposed by McCracken and Eccleston, (2003), with McCracken, Vowles and Eccleston (2004) arguing that acceptance involves the pursuit of "personally relevant goals" (McCracken *et al*, p.159) rather than pain control. The finding that activity improves mood is also not a new one. Research into the treatment of depression has shown that activity engagement is an effective treatment approach, with behavioural activation shown to be as effective as cognitive therapy at both post treatment and follow-up (Cuijpers, Van Straten and Warmerdam, 2007).

1.2.4 The dual-process model of problem solving

Bradtstädter and Rothermund (2002) proposed the dual-process model of problem solving, shown in Figure 2. This model looks to understand how individuals pursue goals while adjusting for changes in their ability to achieve these goals. The dual-process model proposes that individual self regulation is initiated when a perceived or expected goal discrepancy occurs due to changes in personal

circumstances. The aim of self regulation is to remove the discrepancy. Two modes of problem solving are proposed within this model; the assimilative mode and the accommodative mode. The assimilative mode is described as persistence in achieving a goal, while the accommodative mode is described as the modification of goals in line with changes in circumstance. In chronic pain, this would mean continued attempts at solving goals blocked by pain (assimilative), versus, acceptance of the presence of pain and the engagement in wider life goals (accommodative) (Crombez, Eccleston, VanHamme, and DeVlieger, 2008). The activation of the assimilative or accommodative modes is antagonistic in nature, thus, when one is activated the other is inhibited, yet, both can be activated in sequence to allow an individual to disengage from a blocked goal and engage in a new goal (Rothermund, 2006). The application of problem solving approaches is also accompanied with differing attentional focuses. Rothermund (2006) argued that within the assimilative mode, attention is goal focused, which increases the efficiency at which goal related information is processed and stops information related to possible alternatives causing interference. In the accommodative mode, attention is less focused, supporting the processing of information related to possible alternative goals to be explored. This approach allows for resources to be disengaged from a blocked goal, alternatives to be explored and new goal re-engagement to be facilitated.

Bradtstädter and Renner (1990) suggest that both assimilative and accommodative approaches can be adaptive. However, it is the achievability of the goal one pursues which dictates the maladaptive nature of the approach. Continued persistence towards achieving an unobtainable goal is likely to cause distress as is shifting to a new goal if the original goal was achievable. However, Rothermund (2006) argues that the importance the individual places on the goal is also significant, as goals which are seen as personally important may be less open to abandonment. In such circumstances, assimilative coping may therefore continue. This process protects the important goal and inhibits accommodative approaches from being employed. Studies have observed the use of assimilative and accommodative approaches in aging populations. Heyl, Wahl and Mollenkopf

(2007) observed that accommodative approaches became more effective as health deteriorates. However, what remains unclear is at what point an individual decides to continue to persist or change the goal, suggesting the importance of exploring what factors influence this process and the mechanisms involved.

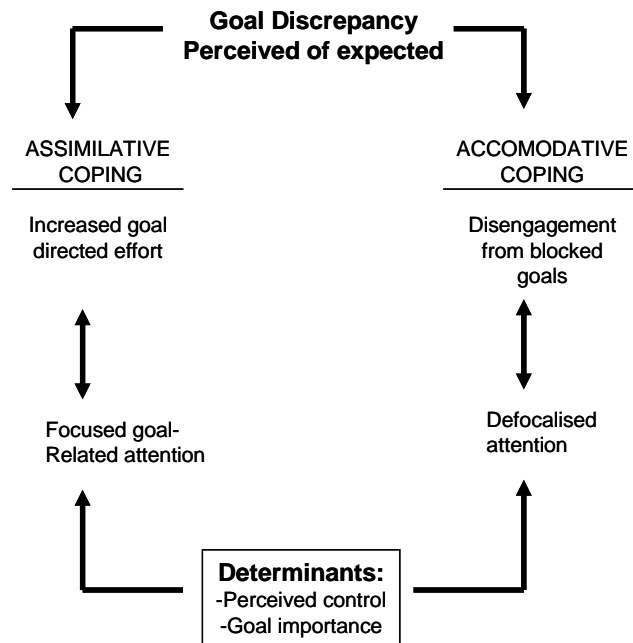


Figure 2 The dual-process model (Redrawn from Rothermund, 2006).

When applying the dual-process model to chronic pain, Schmitz, Saile and Nigles (1996) argued that chronic pain acts as a threat to the achievement of personal goals, by blocking their achievement. It is proposed by the dual-process model that in such circumstances assimilative approaches become maladaptive and accommodative approaches should be used. Schmitz *et al.* (1996) suggest that a patient's perceived ability to control and change the threat of pain is significant in this process, arguing that those who continue to perceive the pain as something which can be controlled and changed will continue to utilise assimilative

approaches. Trying to persist with blocked goals is detrimental to accommodative approaches. Those who perceive their pain to be out of their control and resistant to change will shift to accommodative approaches, thus reappraising and adjusting their aspirations and goals. When testing this hypothesis with 120 chronic pain patients, Schmitz *et al.* (1996) observed that the flexible adjustment of personal goals reduced depression as pain intensity increased. It was also observed that continued pain management was only effective when accompanied with high levels of flexible goal adjustment. These findings suggest that accommodative approaches reduced distress in this sample. It also suggests that for many patients pain management will continue, but that distress reduces if accompanied by flexible engagement in wider life goals. However, it remains unclear from the work of Schmitz *et al.* (1996), if it was solely the patient's view that chronic pain was uncontrollable and unchangeable which resulted in accommodative approaches being employed.

The above suggests that in a chronic pain population, the ability to shift from assimilative to accommodative approaches may be associated with the perceived ability to control and change pain, as per Schmitz *et al.* (1996). However, what may prevent this shift is the importance placed on the pursuit of the original goal due to its personal importance as per Rothermund (2006). Thus, the chronic pain patient may continue to utilise assimilative approaches, as accommodative approaches are inhibited by an individual's persistence with, and therefore protection of, personally significant goals.

Wrosch, Scheier, Carver and Schulz, (2003) argue that an individual's ability to disengage from an unobtainable goal, accompanied by their engagement in new goals is a phenomenon that is difficult to conceptualise. Wrosch *et al.* (2003) argued that people's abilities to abandon and reengage in a goal are likely to vary, as is the timing of these two events. It has also been argued that goal disengagement, and new goal engagement, is not a simple process, as there may be overlap or, indeed, a delay between goal disengagement and new goal engagement. Individuals will also pursue multiple goals at the same time. Despite these difficulties, Wrosch, Scheier, Miller, Schulz and Carver (2005) observed that disengagement from an unobtainable

goal was associated with positive wellbeing only when accompanied with new goal engagement. This suggests that positive wellbeing is associated with a two step process of disengagement from a blocked goal followed by reengagement in a new goal. However, it could be argued that where an individual is unable to generate an alternative, assimilative approaches may persist due to the priority placed on the blocked goal in the absence of an alternative. Therefore, the complexity of what drives a patient's decision to shift from assimilative to accommodative approaches remains difficult to assess at this time. Therefore, further understanding of the possible mechanisms involved is required.

1.3 Perceptual Control Theory and self regulation

Powers (1973) argued that purposeful behaviour requires control and drew upon engineering control systems to develop a mechanistic theory of physiological self regulation within biological organisms. Perceptual Control Theory (PCT) differs from other theories of control as Powers (1973) argued that internal representations of environmental variables are controlled rather than, as control theorists would argue, the output of the system. The systemic context of PCT will therefore be explored as a way of understanding how biological systems self regulate and the implications this has for problem solving in chronic pain populations.

PCT is a theory of behaviour which proposes that it is not the environment which causes the individual to respond through action, but the action of the individual which impacts on the environment, and in turn alters the individual's experience (Powers, 1995). Within this model, personal wants and goals (reference perception) are compared to the current state (present perception) if this comparison notes a discrepancy (dissatisfaction) action is initiated. Thus, action (purposeful behaviour) is the means by which the environment is altered in a way to reduce the discrepancy between reference perception and present state. Action stops when the discrepancy is no longer present (Forssell, 1994). Control, as proposed by PCT, is therefore the result of a feedback loop, as shown in Figure 3, where behaviour is varied until the reference point is achieved (Powers, 1995).

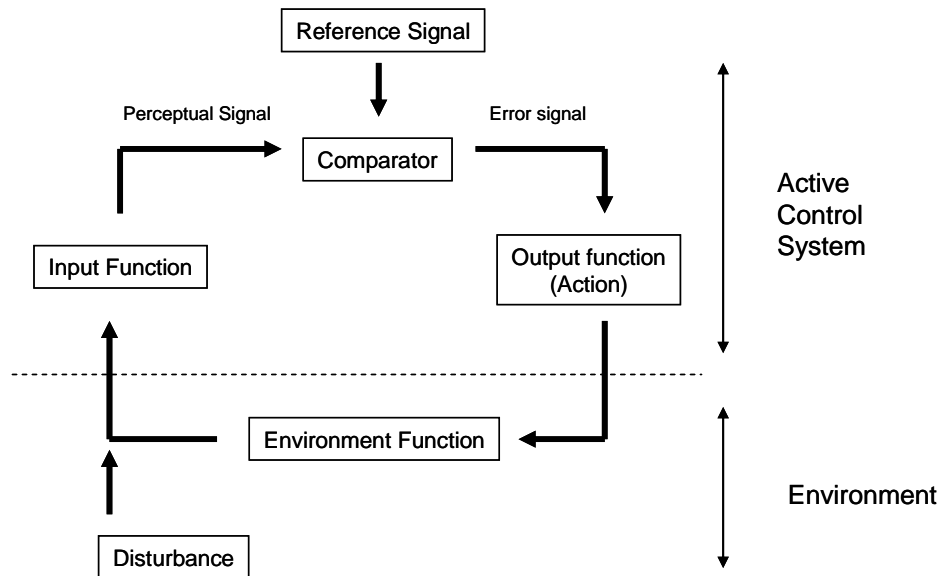


Figure 3 The Perceptual Control Theory control system (Redrawn from Powers, 1973).

As observed in Figure 3, within a perceptual control system the current state is compared to a reference value and the resulting error signal (discrepancy between present state and personal goals) results in a behavioural output which aims to alter the environment external to the system in a way which reduces the discrepancy. A change in the environment results in a change in the present state, which continues the closed loop cycle until the discrepancy is resolved. It is also observed within the control loop that the control system is not the sole influence on the present state, as disturbances outside the control system also have an influence on the present perception (input function) (Powers, 1995). Although the focus of Figure 3 is on a loop where a discrepancy occurs, it should not be assumed that no discrepancy results in non-action. The lack of a discrepancy would merely result in a continuation of current behaviour as the person's reference point (goal) and their current state are aligned (Carver and Scheier, 1982).

1.3.1 Anti-goals within self regulation

Carver and Scheier (2002) highlight one of the difficulties of this model is its focus on approach goals, and lacks an account for goals individuals wish to avoid. Carver and Scheier (2002), based on the work of Markus and Nurius (1986), highlighted the importance of what individuals fear becoming and define these goals as “anti-goals” (Carver, and Scheier, 2002, p.305). In the case of anti-goals the control loop acts as a “discrepancy enlarging loop” (Carver and Scheier, 2002, p.305) serving to move away from the anti-goal. Mansell (2005), argues that the anti-goal discrepancy enhancing loop moves individuals away from that which they fear becoming, but does not provide an alternative for the individual to pursue, the result of which is the experience of emotional distress. Carver and Scheier (2002) argued that discrepancy enhancing loops are stabilised by discrepancy reducing loops and as a result it is proposed that avoidance of the goals one fears (anti-goal) can be achieved by moving towards goals that are consistent with ones values. When applying this to chronic pain populations, Kindermans, Huijnen, Goossens, Roelofs, Verbunt and Vlaeyen, (2011), in a study of 83 patients with chronic non-specific lower back pain, observed that emotional distress was associated with an individual’s proximity to their feared-self. This feared-own discrepancy (attributes individuals feared possessing) was indicative of an increase in safety behaviours, namely the reduction or avoidance of activity in the presence of pain.

1.3.2 Affect as an input to self regulation

Carver and Scheier (2000) propose an extension to the control loop which accounts for the assessment of affect, and how this may in turn influence action. They propose that affect is related to the rate at which the control loop is able to reduce the discrepancy between current state and the desired goal. Thus, arguing that positive or negative affect is based on an assessment of “velocity” (Carver, and Scheier, 2000, p.1717), the rate at which the distance between current state and reference value is reduced. Positive affect leads to less effort being applied, while negative affect, resulting from a slow velocity, initiates efforts to increase the rate at which the discrepancy is reduced. When dealing with an anti-goal, the opposite may

be true, with negative affect occurring when the distance between current state and anti-goal is in close proximity, and where a slow rate of progress is being made to enhance the discrepancy by the control loop.

1.3.3 Hierarchical model of self regulation

Powers (1973) noted the inherent simplicity of PCT when trying to explain the complexity of human behaviour. It is proposed that control systems are hierarchical in nature and that control systems, connected at different levels, explain how behaviour is regulated within living organisms. Powers (1973) argued that behaviour is regulated by a process in which subordinate goals are influenced by superordinate goals. Thus, higher levels set the reference value for the system below. The hierarchy proposed by Powers (1973) breaks down goals into a number of levels including: system concept, principles, programs, relationships, and sequences. Working through the hierarchy, the system concept is conceptualised as the ideal image of self. Thus, self regulation at this level occurs when one tries to act in a manner that is congruent with this self image. This, Powers (1973) argued, creates a reference value for the level of principles. Principles can be thought of as a variety of trait-like qualities which come together to represent one's system concept and can be applied to a variety of behaviours (e.g., to be independent). These, in turn, create a reference value for the next level in the hierarchy programs, which are represented as types of action or scripts (e.g., to make dinner for oneself). However, in order to achieve the program, one must first have a relationship between self, environment, and task (e.g., cooking). This relationship then requires a set of sequences (e.g., chopping vegetables, turning on the oven) which in turn requires a particular set of collective motor responses and muscle tensions (e.g. grasping, holding, moving). Within this model, each higher level creates a reference value for the one below, with each level providing input to the ones above. This process alters behaviour through comparison between present state and reference value at each level. Nonetheless, Carver, and Scheier (1998) proposed that there are a number of alternatives at each level which can be substituted as a means of achieving the system concept. For example, independence could be achieved by being able to

drive. This creates an alternative means of achieving the principle goal, and suggests that there is flexibility in goal attainment within the hierarchical system. Therefore, the blockage of one program goal does not prevent the principle goal from being achieved, but does suggest that an individual needs to be flexible, adapting to the blockage by finding an alternative. This process is shown in Figure 4. If the attainment of goal A is blocked, principle goal 1 could still be achieved, by shifting from the blocked program goal A to the new program goal B. Alternatively, a shift to a new principle goal (goal 2) would also allow the system concept to be maintained and could be accessed by shifting to program goal C.

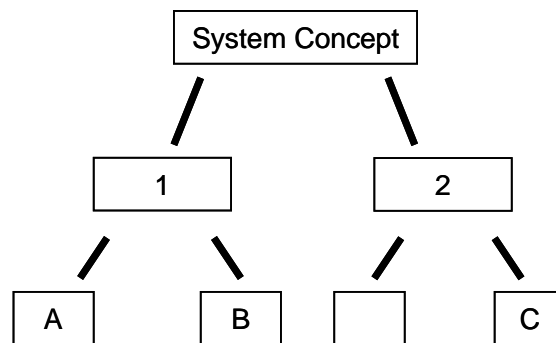


Figure 4 Achievement of blocked goals (Redrawn from Carver, and Scheier, 2000).

The notion of alternatives has key implications when it comes to the achievement of personal goals which are blocked in chronic pain. In reference to Figure 4, one may be unable to achieve goal A due to pain but could still maintain a sense of self through either the achievement of goal B or goal C. This links to the dual-process model as continuing to strive to achieve a principle goal (goal 1) through a blocked program goal (goal A) would be assimilative in nature, while changing to a different program goal (goal B or C), thus adapting to the blockage would be accommodative. Powers (2010, p.3) defined the process of shifting between goals in order to overcome a blockage as “reorganization” and argued that reorganization occurs when the patient’s attention is directed towards conflicting goals within the hierarchical system. The role of attention as a factor in the search for alternatives has also been highlighted previously in relation to the dual process

model, as Rothermund (2006) proposed that when in the accommodation mode attention has a wider perceptual field, thus allowing alternative goals to be explored. It could therefore be argued that both PCT and the dual process model emphasise the importance of shifting awareness in order for alternatives to be explored.

Although flexible goal adjustment is highlighted as significant in adapting to blocked goals within PCT, what remains unclear is what drives an individual to persist with a blocked goal or adapt to the blockage by shifting to a new goal.

1.3.4 Possible mechanisms of goal disengagement and new goal reengagement

Considering PCT, and the work of Powers (1973), Carver and Scheier (1999) suggest that the process of expectancy assessment may influence goal disengagement; this process is shown in Figure 5. Carver and Scheier (1999) suggest that expectancy assessment is separate to the control loop system, but can occur at any point of the discrepancy reducing process. Within this system attention shifts towards self, focusing on the present state and the prevailing reference value. The role of this system is to assess the expectancy at which the discrepancy between present state and reference value can be reduced. If the expectancy is unfavourable, then withdrawal from the discrepancy reducing attempt occurs. Carver and Scheier (1999) suggested that the consequences of expectancy assessment are binary in nature; being either to persist or to disengage. It is proposed that this assessment draws on a variety of information, including one's resource availability, and is, therefore, adaptive to the individual's current physical and psychological constraints. The process of expectancy assessment may go some way towards developing a potential understanding of the mechanisms underlying goal engagement and disengagement. However, the model does not account for why some patients persist with goals despite feedback that a successful outcome will not occur, as in the case of chronic pain.

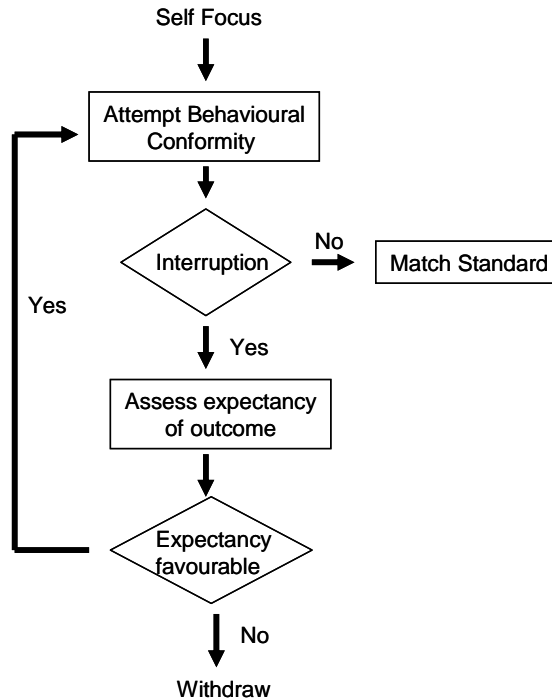


Figure 5 Expectancy assessment process (Redrawn from Carver, and Scheier, 1999).

1.4 Measuring problem solving

1.4.1 Measurement of the dual-process model of problem solving

The dual-process model proposes that when a goal is blocked due to a change in circumstance one can attempt to remove the blockage, and continue to achieve the goal in the same way (assimilative), or adapt to the blockage, by changing the goal in line with the change in circumstance (accommodation). As the current research will explore problem solving in terms of the dual-process model an understanding of how the components of this model are assessed is important. Bradtstädter and Renner (1990) developed the Tenacious Goal Pursuit (TGP) and the Flexible Goal Adjustment (FGA) scales as a means of measuring assimilative and accommodative problem solving. Bradtstädter and Renner (1990) observed in a sample of 860 adults aged 34 -63 years that accommodative approaches increased while assimilative approaches decreased with age. The authors argued that their findings go some way towards explaining how individuals maintain an overall sense

of wellbeing as they age, by adjusting to the changes in circumstance they experience. However, Bradtstädter and Renner (1990) also note that both the TGP and FGA scales measure an individual's "tendencies" (Bradtstädter and Renner, 1990, p.61) towards problem solving, acknowledging that problem solving approaches may vary in differing situations.

DeVlieger, Bussche, Eccleston and Crombez (2006), developed the Pain Solutions Questionnaire (PaSol) as a move towards the measurement of assimilative and accommodative problem solving in chronic pain. This measure was based on the TGP and FGA scales developed by Bradtstädter and Renner (1990). When using the PaSol, Crombez *et al.* (2008) observed that assimilative approaches to pain were associated with greater distress, disability, and attention to pain. These findings support the notion that continued persistence at solving an insoluble problem causes distress and that goal adjustment may be important.

However, DeVlieger *et al.* (2006) describe the PaSol as measuring attitudes to problem solving. Similar to the TGP and FGA scales, the PaSol is unable to capture an individual's situational specific problem solving attempts. Therefore, the PaSol addresses some of the limitations of the use of the TGP and FGA scales as it is context specific. However, the use of self report measures to assess complex problem solving approaches is not without its own limitations. Therefore, DeVileger *et al.* (2006) argued that future research exploring the links between attitudes to problem solving and problem solving attempts would be important in understanding how people try to solve the unwanted impact of pain.

1.4.2 Measuring self regulation and dual-process

Wells (2010) attempted to address the limitations of using a questionnaire approach to measuring problem solving, as identified for the PaSol by developing the Means-End Problem Solving *for Pain* (MEPS *for Pain*) measure. This measure was developed based on the theories of both the dual-process model, and the control theory of self regulation. The MEPS *for Pain* is an adaptation of the Means-End Problem Solving (MEPS) measure and methodology as proposed by Platt and Spivack (1975). The MEPS measures a participant's problem solving abilities and

the steps required to achieve a solution to a vignette based problem. Participants are given the beginning of a story where the problem is outlined and the end of the story, where the solution is achieved. Participants are then asked to complete the story by explaining how the solution may be reached.

Within the *MEPS for Pain*, each vignette draws on the control theory of self regulation by identifying a program which is blocked by pain ('Frank is unable to play tennis due to back pain') and a principle ('sociable'). The ending of the story is purposefully left open ('you end the story when Frank no longer feels upset') to allow the participant to have the option of changing both the program and principle goals, and aiming to measure the participant's flexibility in problem solving. A full explanation of the *MEPS for Pain* and its construction is given in the method section.

The scoring of participants' responses is based on the conceptualisation of assimilative problem solving as continued persistence with a blocked program goal, where pain acts as the blockage (e.g., taking medication to continue to play tennis). While accommodation is conceptualised as engaging in a different program goal due to the presence of pain (e.g., organising social activities at the tennis club), or shifting to a different higher level principle goal (e.g., focusing on work and being seen as hard working).

Unlike questionnaires such as the PaSol, the *MEPS for Pain* qualitatively records an individual's problem solving approach and then applies a quantitative scoring framework to responses. The *MEPS for Pain* has been shown to have modest reliability (assimilative scale $\alpha = 0.77$, accommodative scale $\alpha = 0.64$), however, the validity of the *MEPS for Pain* when compared to measures of attitudes towards assimilative and accommodative problem solving (e.g., the PaSol), was only tentatively established. Wells (2010) argues that due to the *MEPS for Pain* being a new measure, further data collection to support the reliability and validity of the measure is required.

1.4.3 Limitations of the MEPS for Pain

When measuring problem solving the only measure available prior to the MEPS *for Pain* was the PaSol. However, The PaSol measures attitudes towards assimilative and accommodative problem solving, rather than participant's situational attempts at problem solving. Therefore, the MEPS *for Pain* moves the research closer to a way of measuring participants' problem solving attempts, however, is not without its limitations.

The first limitation is related to the way assimilative and accommodative responses were presented and explored by Wells (2010). When scoring the MEPS *for Pain*, participants' responses are first scored in terms of the different types of assimilative and accommodative approaches provided and then summed to give an overall assimilative and accommodative score. However, what is unclear in the work of Wells (2010) is the frequency of different types of problem solving approaches used by participants and how these contribute to the overall score. This limitation could be addressed by offering a breakdown of the types of approaches used and their frequency. Such an analysis may add to the research by offering an understanding of where chronic pain patients focus their problem solving attempts.

It is noted by Wells (2010) that when analysing the MEPS *for Pain* transcripts, goal abandonment was an approach used by participants and was scored as either assimilative, or accommodative depending on the participant responses. Where participants abandoned goals due to a blocked program, and identified an alternative goal, this was scored as accommodative. Where goals were abandoned but no alternative was offered, this was scored as assimilative. This limitation suggests a need to revisit the MEPS *for Pain* scoring framework and explicitly identify the rules for scoring goal abandonment without new goal engagement. This limitation has important implications as previous research has shown that disengaging from a blocked goal, in the absence of new goal engagement results in greater distress, and disability (Wrosch *et al.*, 2003).

When completing the MEPS *for Pain*, participants are asked to think how they would respond to the problem scenario if they were the person in the story. Wells (2010) argues that the use of these instructions to participants was an attempt

to bring the measure as close to the participant's own problem solving approach as possible. What was clear, however, was that some participants did this, providing personally relevant information, while others did not. This has led Wells (2010) to argue "although the MEPSP measures respondents' ability to generate different types of solutions to problem vignettes it does not measure the extent to which participants apply this to their own lives" (Wells, 2010, p.79). This suggests that there is a need to try to measure personal problem solving. One way this could be possible would be to ask participants to identify a blocked goal and how they might achieve this goal despite their pain.

1.5 Self identity and pain

1.5.1 Self discrepancy theory and possible selves

There have been a number of models which have emerged from the literature in relation to self identify, one such model is the self discrepancy theory (SDT) proposed by Higgins (1987). Higgins (1987) proposed that an individual's conceptualisation of self can impact upon mood. Within this model, emotional responses are based on the discrepancy an individual holds between how they are, their actual-self, and either their ought-self, how they believe they should be, or their ideal-self, how they hope or wish to be. A discrepancy between actual and ideal selves results in feelings of disappointment, dissatisfaction, and sadness as positive outcomes are not available, while a discrepancy between actual and ought results in feelings of fear, threat, and restlessness as the discrepancy represents the presence of negative outcomes and consequences. The theory proposed by Higgins (1987) is, therefore, one of proximity, with greater perceived distance between actual-self and ideal/ought-self representing greater distress. However, one of the limitations of this model, is it focuses on what an individual would like to be, not what they wish to avoid being.

Along a similar track Markus and Nurius (1986) proposed the notion of possible selves, and suggest that the motivation to achieve one's goals are derived from a motivation to achieve a representation of what one hopes to be in the future (hoped-for self) while trying to avoid what one fears becoming (feared-for self).

Hooker and Kaus (1994) proposed that a cognitive-emotional association is observable between possible selves and life values, which subsequently motivates behaviour. Therefore, actions which serve to increase the probability of a hoped-for self occurring enhance positive emotions, increasing the individual's motivation to continue to engage in the behaviour. Conversely, increased proximity to a possible feared-for self will carry negative emotions thus motivating behaviour which serves to avoid the feared-for self coming true. The notion of possible selves has links to the work of Powers (1973), and Carver and Scheier (2002), as hoped-for and feared-for self values would be seen as reference values within the hierarchical control system at the level of principles, with hoped-for self values acting within a discrepancy reducing loop, and feared-for self values representing anti-goals, and therefore acting within a discrepancy enhancing loop. The combination of these models may help explain the mechanisms by which individuals pursue these life values.

1.5.2 Possible selves and enmeshment

The schema-enmeshment model of chronic pain has emerged from the literature as an attempt to understand patterns of cognitive bias in chronic pain (Pincus and Morley, 2001). Pincus and Morley (2001), to explain the attention chronic pain patients pay to pain and illness related stimuli, developed a model of schema enmeshment relating to the self, pain, and illness. It is argued that schemas “contain a stored body of knowledge that interacts with task demands for attending to and disambiguating stimuli and for encoding and structuring retrieval of information” (Pincus & Morley, 2001, p.607). Within this model, the activation of different schemas at the same time, result in parts of one being incorporated into that of another. This process of multiple-schema activation is termed enmeshment (Pincus, and Morley, 2001). In the case of chronic pain, the pain schema is activated alongside the illness and self schemas. The extent to which these schemas overlap is indicative of distress. Pincus and Morley (2001) proposed that different types of enmeshment may occur within chronic pain. Figure 6 shows different types of schema-enmeshment. If pain and illness schemas become enmeshed, while the self

schema has little overlap the individual experiences less distress, as enmeshment affects daily functioning, but the sense of self remains intact. Enmeshment of all three schemas causes distress, as pain, illness, and self become entwined.

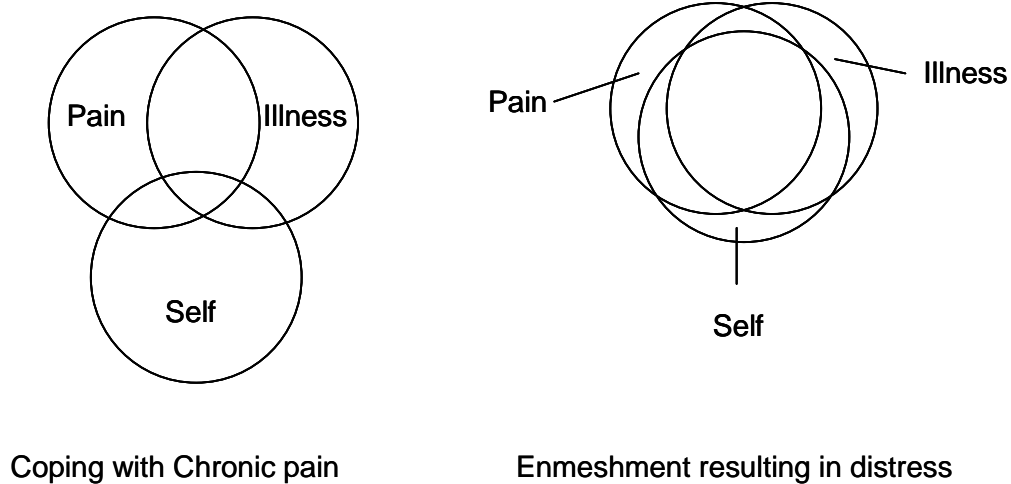


Figure 6 Overlap of self, pain, and illness schemas (Redrawn from Pincus and Morley, 2001).

When enmeshment occurs, the ability to achieve one's life goals are perceived to be blocked by pain, resulting in continued attempts to remove the pain. It has also been highlighted that when realising one's fears and/or hopes for the future are highly dependent on the presence of pain, removing the pain is likely to become a significant goal. Therefore, continued persistence in assimilative coping approaches to remove pain despite feedback that this approach is ineffectual may continue due to the significance being placed on one's hopes and fears for the future.

Although the schema-enmeshment model offers a means of conceptualising the process of enmeshment, it does not suggest how chronic pain patients become un-enmeshed. Wells (2010) argued that goal disengagement and new goal engagement may be involved in the un-enmeshment process, though acknowledged the difficulty for patients given the value being placed on the original goal of pain removal. Morley, Davis and Barton (2005) found, when using the possible selves approach that the perceived achievement of the patients hoped-for self characteristics in the presence of pain was indicative of lower depression scores and greater acceptance of pain. This finding is supported by Sutherland and Morley

(2008) and links back to the work by Hooker and Kaus (1994), supporting the argument that distress may be reduced if the chronic pain patient is able to disengage from goals associated with avoiding what they fear becoming whilst engaging in goals which move them closer to what they hope to become, in spite of the pain. Based on the work of Carver, and Scheier (1998, 1999), and that of Bradtstädter and Rothermund (2002) it could be argued that a patient's expectancy assessment combined with an ability to shift from assimilative to accommodative problem solving approaches may support individuals to disengage from a blocked goal and re-engage in a new goal in order to avoid what they fear becoming in the presence of pain.

1.5.3 Measuring possible selves and enmeshment

As this research will explore possible selves and enmeshment it is important to explore how these constructs have been measured. In an attempt to measure possible selves, Hooker and Kaus (1994) used the possible selves questionnaire. This measure is an open ended questionnaire which asks participants to generate a list of possible hoped-for and feared-for selves. Participants are then asked to rate on a 7 point Likert scale how likely they were to achieve/prevent their hoped-for/feared-for self (efficacy) and how likely their hoped-for/feared-for self was going to come true (expectancy).

Morley *et al.* (2005), in a study exploring self-pain enmeshment, used an adapted form of the possible selves questionnaire. This adapted questionnaire asked participants to first self generate up to 10 hoped-for, and feared-for self characteristics and then, considering each characteristic individually, to make an judgement as to the conditionality of pain to each characteristic (conditionality). Participants were therefore asked, for the hoped-for self characteristic, if the characteristic would be possible if they remained in pain. For the feared-for self characteristics, participants were asked if the characteristic would be possible if they were without pain. Enmeshment was conceptualised as the conditionality of each characteristic on the presence or absence of pain (i.e., the number of 'no' responses

as a proportion of the total number of responses given). The efficacy and expectancy measures used by Hooker and Kaus (1994) were retained.

The possible selves questionnaire was further adapted by Sutherland, and Morley (2008), and a method of generating proximity to the possible self added. Proximity is conceptualised as the discrepancy between actual self and possible self. Participants are asked “How close do you currently feel you are to this characteristic?” The participant is asked to respond to this question using a 7 point likert scale where 1 = I am just like this and 7 = I am the complete opposite of this. A mean proximity score is then generated.

The final adaptation was introduced by Wells (2010). Prior use of the possible selves questionnaire by Morley *et al.* (2005), Sutherland and Morley (2008) had asked participants to self generate their feared-for and hoped-for self characteristics. Wells (2010) changed this process by providing participants with cards identifying 25 feared-for characteristics and asking them to choose up to 10. The 25 feared-for self characteristics were generated from the previous work of Morley *et al.* (2005), Fogg (2007), and Sutherland, and Morley (2008). Wells (2010) argued that this approach increases the number of characteristics chosen, while reducing participant fatigue.

1.5.4 Linking possible selves, enmeshment and problem solving.

Wells (2010) combined the work on possible selves (Markus, and Nurius, 1986) with that of the dual-process model (Bradtstädter and Rothermund, 2002) and the control theory of self regulation (Powers, 1973; Carver and Scheier, 1998) by using the *MEPS for Pain* and feared-for self questionnaire. The aim of this work was to try to explain why patients with chronic pain persist with blocked goals. It was observed that those who were both in close proximity to their feared-for selves and more enmeshed were more likely to use assimilative approaches to solve the problem of pain. The research conducted by Wells (2010) represents the first attempt to explore the relationship between self identify and problem solving, however, only feared-for self aspect of the possible selves questionnaire were used. Wells (2010) argued that further research should include the hoped-for self interview

as a way of further understanding the relationship between self-pain enmeshment and problem solving.

Although Wells (2010) highlighted the use of the hoped-for self interview as a means of further understanding the relationship between self-pain enmeshment, it could be argued, given the limitations of the MEPS *for Pain*, the use of this measure may also provide a way of measuring personal problem solving attempts. Hoped-for self characteristics represent principles as identified within the hierarchical model of self regulation (Powers, 1973). When completing the hoped-for self interview, participants identify which of these characteristics (principle goals) are blocked by pain (conditionality). These blocked hoped-for self characteristics, therefore represent personal problem scenarios. Wells (2010) argued that participants who are enmeshed may become un-enmeshed by pursuing personally relevant goals. It may therefore be hypothesised that those participants who are enmeshed, but can apply accommodative problem solving approaches to the blocked goal, may be less distressed as a result. The current research will explore this tentatively by using the hoped-for self interview as a personal problem scenario for those participants who identify characteristics which are perceived to be blocked by pain, with the MEPS *for Pain* scoring framework being used to assess assimilative and accommodative problem solving approaches. The detail of this approach is outlined in the method section.

1.6 Summary and research aims

1.6.1 Summary

A great deal of research and clinical focus has been placed on managing the patient's experience of chronic pain, given the impact pain has on mood, (De Vlieger *et al.* 2006) anxiety, (McCracken and Eccleston, 2003), and thought processes such as catastrophizing (Richardson, *et al.*, 2010), and the impact such experiences have on treatment outcomes. Some commentators have argued that activity engagement is significant within this process, with disability and distress being seen to reduce as activity increases (Linton, *et al.*, 2002). However, others have argued that activity, in and of itself, is not sufficient, and that acceptance of

pain, and the engagement in personal values and goals in spite of the pain is central to the process of adjustment in chronic pain (McCracken and Samuel, 2007; Nicholas and Asghari, 2006).

There have been a number of interconnected models proposed which suggest the possible process of adjusting to the presence of chronic pain and the blockage pain causes to the attainment of personal values and goals. The dual process model proposed by Bradstädter and Rothermund (2002), has been used within the field of chronic pain to suggest that pain acts as a threat to the achievement of personal goals and as a result distress can be reduced if the patient is able to shift from persistence with a blocked goal (assimilative problem solving) to engagement in wider life goals (accommodative problem solving). The perceived controllability of pain and the significance of the blocked goal have, however, been noted to be important in whether this shift occurs (Schmitz *et al.*, 1996; Rothermund, 2006), although there remain difficulties within the literature in clearly conceptualising the process by which patients disengage from blocked goals and reengage in new goals. Along a similar line Powers (1973) proposes the Perceptual Control Theory, and presents a hierarchical model of human motivation which is driven by goal attainment. It is argued within this model that at lower levels, there are a number of alternatives which can be substituted to achieve higher order goals at the level of personal values, should a blockage occur (Carver and Scheier, 1998). This model, therefore, suggests that alternative routes are available in spite of a blockage, but it is the individual's ability to shift to these alternatives which is important. Within the chronic pain literature it is clear that patients continue to persist with goals which are blocked by pain despite feedback that such an approach is unlikely to lead to a resolution, resulting in both distress and disability (McCracken and Eccleston, 2003).

The literature reviewed, therefore, raises the question of why patients with chronic pain continue to persist with assimilative problem solving approaches in the absence of a solution. In an attempt to answer this question, some researchers have turned to the field of self identity and the notion of possible selves as proposed by Markus and Nurius (1986). This work proposes that individuals are motivated

towards what they hope to be in the future (hoped-for self) while trying to avoid what they fear becoming (feared-for self). This work draws parallels to that of Powers (1973) and Carver and Scheier, (1998, 1999) as these possible selves are defined as system concepts within the Perceptual Control Theory, with the mechanisms of discrepancy reducing and discrepancy enhancing loops explaining the way by which an individual moves towards or away from such values. Research has suggested that two processes motivate individuals to try to solve the pain; proximity to the feared-for self and enmeshment, with both significantly impacting on distress. Proximity to the hoped-for self was indicative of lower distress and pain acceptance in chronic pain populations (Morley *et al.*, 2005). Therefore, it could be suggested that aspects of what patients fear becoming, in the absence of what they hope to become, may explain why patients persist with assimilative problem solving in the absence of a solution. It could also be argued that where there is enmeshment of either the feared-for self and pain or the hoped-for self and pain assimilative problem solving approaches are likely to be used due to significance being placed on achieving one's values by removing the pain which is perceived to be blocking the realisation of these values. Therefore, it is the aim of this research to investigate the association between persistent problem solving and possible selves.

1.6.2 Research aims

This research has two aims. The first aim is to replicate the work of Wells (2010). Wells (2010) focused on the relationship between the chronic pain patient's avoidance of potential feared-for selves and the use of assimilative problem solving approaches. To measure problem solving Wells (2010) developed the MEPS *for Pain*. However, Wells (2010) identified a number of limitations around the development and use of the MEPS *for Pain* in the chronic pain population. The limitations of the MEPS *for Pain* included the newness of the measure, and the extent to which participants apply problem solving approaches to their own problems. It is envisaged that a replication of the study will address some of the limitations identified with the MEPS *for Pain*, while collecting further data on the relationship between possible selves and assimilative problem solving.

The second aim of this thesis is to extend the work of Wells (2010). To supplement the exploration of chronic pain patients' avoidance of their feared-for self, this research will look at the association between patient's proximity to their hoped-for self, and problem solving approaches. To link this work back to the limitations of the MEPS *for Pain*, it is envisaged that personal problems will be measured as part of the hoped-for self interview.

Whilst this thesis aims to replicate and extend the work of Wells (2010) it is important to note that the literature review, as well as the work of Wells (2010), has identified a number of predicted associations between problem solving, possible selves and functioning. These associations will be explored as background hypotheses within this thesis and will be commented on in the results and discussion sections.

This leads to two hypotheses for this research being generated, as outlined below.

1.6.3 Hypotheses

- 1) Individuals who are closer in proximity to their feared-for self and more enmeshed are more likely to use assimilative problem solving approaches.
- 2) Individuals who are closer in proximity to their hoped-for self and less enmeshed are more likely to use accommodative problem solving approaches.

CHAPTER 2: METHOD

2.1 Research question and hypotheses

2.1.1 Research question

To what extent do chronic pain patients try to solve pain related goals to the detriment of wider life goals?

2.1.2 Hypotheses

1) Individuals who are closer in proximity to their feared-for self and more enmeshed are more likely to use assimilative problem solving approaches. Higher proximity to and greater enmeshment with an individual's feared-for self will therefore predict assimilative problem solving scores.

2) Individuals who are closer in proximity to their hoped-for self and less enmeshed are more likely to use accommodative problem solving approaches. Higher proximity to and less enmeshment with an individual's hoped-for self will therefore predict accommodative problem solving scores.

2.2 Design

As this is a replication of the work of Wells (2010) the same design will be used. This is a single group, observational design. This design was used as a means of observing and describing the association between patients' possible selves and problem solving approaches, and did not set out to establish a causal relationship between these phenomena. This approach has been used previously in the literature (Morley *et al.*, 2005; Sutherland, 2004). The data were analysed by means of correlations to establish the relationship between possible selves (feared-for self and hoped-for self) and assimilative/accommodative problem solving. Wells (2010) for example, using non-parametric correlations, assumed a small-medium effect size of $r = 0.35$ and $\alpha = 0.05$ with a power of $= 0.80$, which generated a sample size of 60.

2.2.1 Ethical and local approval

Ethical approval for this study was granted by the Leeds Central Research Ethics Committee. The letters of ethical approval are presented in appendix 1.

2.3 Participants

Participants were recruited from an NHS primary care pain clinic in the Leeds area. Patients attending the clinic, who fulfilled the inclusion criteria as set out below, were approached by the researcher or the Clinical Nurse Specialist in the absence of the researcher, and provided with an information sheet inviting them to participate in the study.

2.3.1 Inclusion criteria.

- 18 years of age and older.
- Pain duration of 6 months and over.
- Have a sufficient level of fluency in English to complete measures.

2.3.2 Exclusion criteria.

- Malignant pain e.g. cancer.
- Known Learning Disability.
- Currently experiencing a psychotic episode.

2.4 Measures

2.4.1 Demographic data.

The following demographic data were collected: age, gender, self reported pain duration, diagnosis, previous treatment(s) received, and school leaving age. The demographic data were used to index the sample population, while also being controlled for during data analysis. The collection of these data is consistent with that of Wells (2010), with the exception of reading and writing difficulties at school. This item was removed on the basis of its redundancy, given the use of a verbal fluency measure which has established norms within the literature (Ruff, Light, Parker and Levin, 1996).

2.4.2 Measure of verbal fluency

As the MEPS *for Pain* and the possible selves interviews are heavily dependent on participant verbal ability a measure of verbal fluency was also employed in this study. This allowed this variable to be controlled for during data analysis.

Controlled Oral Word Association test (COWA; Benton & Hamsher, 1976). Participants are asked to list as many words they can think of beginning with the letter C in one minute. This is then replicated for the letters F and L, with the total score being the number of words listed. Duplicate words, words with the same extension, names of people, and place names are not counted. Ruff, Light, Parker and Levin (1996) have demonstrated that the measure has good reliability ($\alpha = 0.83$) and is stable over time (test-retest reliability $\alpha = 0.74$). Once a total score is generated, a qualitative interpretation can be assigned to a participant's score, these interpretations range from 'seriously deficient' to 'very superior' (Ruff *et al.*, 1996). The use of this measure has been indicated within the literature by studies using similar methodologies and clinical populations (Morley *et al.*, 2005; Sutherland and Morley, 2008; and Wells, 2010).

2.4.3 Pain measures

As a means of measuring the impact of pain on daily functioning, three measures were administered to assess pain intensity, pain interference and pain acceptance, respectively the association between pain experiences and variables such as mood and problem solving has previously been highlighted in the literature reviewed, supporting their rationale for inclusion in this study.

Pain Visual Analogue Scales (VAS). This measure was used to assess pain intensity and is presented in Appendix 2. Participants are required to mark on a standard length line (0-100 mm) the level of pain intensity they experience. As suggested by Von Korff, Ormel, Keefe and Dworkin, (1992) VAS were used to assess pain intensity at its highest, lowest, and usual levels. Participants rated their pain

intensity by placing a mark on a line which ranged from 'no sensation' to 'the most intense pain imaginable'. The mean of the three scales were then calculated as a measure of pain intensity. Von Koff, Deyo, Cherkin and Barlow (1993) suggest that when assessing pain intensity, scores of below 5 (50mm) indicate low intensity, while scores above 5 indicate high intensity.

Pain disability index (PDI; Pollard, 1984). This measures the extent to which pain interferes with daily activities. Participants are presented with seven life domains and are asked to rate the level of pain interference on a 0-10 scale (0 = No Disability; 10 = Worst Disability). The scores are then summed to give a total interference score. The PDI has been shown to have good reliability ($\alpha = 0.74$) and validity (Tait, Chibnall, and Krause, 1990). Tait *et al.* (1990) observed, in a sample of 444 chronic pain patients, that high PDI scores were significantly correlated with participants' self reports of distress, pain characteristics, and reduced activity, when compared to low scorers on the PDI.

Chronic pain acceptance questionnaire (CPAQ; McCracken, Vowles & Eccleston, 2004). This questionnaire consists of 20 items, and measures pain acceptance. The scale contains two sub-scales; activity engagement and pain willingness. Activity engagement contains 11 items and measures participant engagement in activity despite pain, with higher scores indicating the pursuit of life activities despite pain. The Pain Willingness scale contains 9 items and measures attempts to control pain. Items on this scale are reverse scored with higher scores indicating less investment in pain control attempts. Participants are asked to rate their responses on a 7 point likert scale (0 = Never true, 6 = Always true), with both the activity engagement and pain willingness scales being summed to give a total acceptance score. Higher total scores indicate greater acceptance. This measure has been shown to have good reliability ($\alpha = 0.85$) and validity, correlating with scales of psychological distress and functioning (McCracken *et al.*, 2004).

2.4.4 Measures of pain related problem solving

To test the proposed hypotheses of the research project two measures of pain related problem solving were administered.

The possible solutions to pain questionnaire (PaSol; DeVileger et al., 2006). This questionnaire has fourteen items, and four subscales. The subscales contained within the questionnaire are: 1) the solving pain scale, four items 2) the meaningfulness of life despite pain scale, five items 3) the acceptance of the insolubility of pain scale, three items and 4) the belief in a solution scale, two items. Participants are instructed to assess the extent to which each statement presented applies to them on a 7 point likert scale (0, not at all applicable, to 6, highly applicable). The PaSol is presented in Appendix 3. Assimilative coping attitudes are measured by the solving pain scale; therefore those scoring high on this scale persist in attempts to control their pain. Accommodative coping attitudes are measured by the meaningfulness of life despite pain scale, and the acceptance of the insolubility of pain scale, with higher scores indicating a greater acceptance of pain and being able to engage in wider life goals in spite of the pain. The PaSol, has been shown to have good reliability (internal reliability α 0.78) and validity. Crombez *et al.* (2008), proposed that an assimilative problem solving score can be generated by summing scores on the solving pain scale with the reversed scores on the meaningfulness of life despite pain scale and the acceptance of the insolubility of pain scale. This is the scoring method described and used by Wells (2010) and will therefore be used in the current research.

The means-end problem solving for pain task (MEPS for Pain; Wells, 2010). The MEPS for Pain is an adaptation of the Means-End Problem Solving measure and methodology as proposed by Platt and Spivack (1975). This measure was developed by Wells (2010) and its design and scoring was constructed with reference to the control theory of self regulation (Powers, 1973; Carver and Scheier, 1998) and the dual-process model of problem solving (Bradstädter and Rothermund, 2002). The MEPS for Pain provides individuals with four vignettes involving pain scenarios.

The pain scenarios are presented in Appendix 4 and are constructed based on program goal attainment which had been blocked by the presence of pain. As shown in Table 1, each scenario follows a set structure with a principle goal (e.g., to be sociable and well-liked) a program goal (e.g., to play tennis) and a context (e.g., tennis club) being presented to the participant.

Participants are asked to complete the story and their responses are recorded and later transcribed. The MEPS *for Pain* scoring procedure, as defined by Wells (2010), is based on the categorisation of responses into three main areas; persistence, removal solution and alternative solution. Persistence is defined by Wells (2010) as a response which involve persisting with the same program to achieve the same principle (e.g., continuing to play tennis) and/or persisting with a removal solution when given feedback that this approach is ineffective by the researcher. A removal solution is defined as any response which involves removing the pain (e.g., taking medication to continue to play tennis). An alternative solution is defined as any response which doesn't involve the removal of pain. Within the alternative solution category responses may involve changing the program goal but retaining the context and principle goal (e.g., organising social events at the tennis club), changing the program goal and context but retaining the principle goal (e.g., leaving the tennis club and spending time with work friends) or changing the principle goal (e.g., being well-liked is not longer important and focus is given to improving performance at work). Based on these categories an assimilation score and an accommodation score is produced, with the assimilation score being the total number of persistence and removal solutions and the accommodation score being the total number of alternative solutions.

Table 1 Vignette sequence and example scenario (Reproduced from Wells, 2010).

Vignette Structure	Pain Scenario
Statement of problem that indicates reference to a blocked program goal due to pain.	Frank couldn't play tennis any more because of his back pain
Statement relating blocked program goal to the blocking of a principle goal and the emotional consequence of this	Frank felt that his friends at the tennis club might be avoiding him. This upset Frank as it was important for him to be a sociable and well-liked person.
Ending which indicates the problem has been resolved.	The story ends when Frank no longer feels upset.
Instruction for completing the story	You begin the story when Frank first notices his club mates are avoiding him.

2.4.5 Measure of distress

The literature review has shown that emotional distress is a significant variable when looking at the impact of chronic pain on functioning, with many treatment interventions using measures of distress as an outcome measure.

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). This is a measure of anxiety and depression, which is used widely and regularly in out-patient physical health departments. The HADS is quick to administer, consisting of 10 items, 5 depression items and 5 anxiety items. The measure has been shown to have good reliability (depression $\alpha = 0.70$, Anxiety $\alpha = 0.74$) and validity. The scale generates a depression and an anxiety score, which can then be summed to give an overall score of distress, with higher scores being indicative of greater distress (Wells, 2010).

2.4.6 Measures of proximity and enmeshment – Feared-for self interview

To replicate the work of Wells (2010) the feared-for self interview was administered. The procedure for the completion of the Feared-for self interview is shown in Appendix 5. The feared-for self interview is based on the work of Hooker, and Kaus (1994) and was first adapted for use with the chronic pain population by Morley, *et al* (2005). The procedure for use is as follows:

The concept of feared-for selves is first explained to the participant, following which they are asked to think of their own feared-for selves. The participant is then given 25 cards containing potential feared-for selves. The twenty five feared-for self characteristics were the same as those used by Wells (2010), and are used as a means of providing prompts to participants while also reducing the time taken to complete the overall interview. The 25 feared-for self characteristics used were; Frustrated, Frightened, Disabled, Sombre, Inferior, Bitter, Insecure, Pessimistic, Tired, Nervous, Moody, Lonely, Aggressive, Worrying, Unhappy/depressed, Short tempered, Not wanting to spend time with others, Uncared for, Self-obsessed, Jealous, Unmotivated, Unreliable, Complaining, Demented, Bossy. These characteristics were taken from a content analysis of feared-for selves conducted by Goossens, Kindermans, Morley, Roelofs, Verbunt and Vlaeyen (2010).

Once the participant had had an opportunity to look through the 25 feared-for self characteristics, the participant is instructed to choose 10 characteristics from the cards or they can, should they wish, choose 10 of their own. The characteristics chosen by the participant are recorded and for each characteristic the participant is asked “Is it possible to be like this without pain?” To which the participant is then asked to respond ‘Yes’ or ‘No’. This process is used to assess pain and self enmeshment, as participants’ responses indicate the conditionality of pain in the realisation of a possible future self. Enmeshment is calculated by dividing the number of ‘no’ responses by the number of feared-for self characteristics generated, with a score of 1 indicating total enmeshment. This method of calculating enmeshment has been used in previous studies (Morley *et al.*, 2002; Sutherland and Morley, 2004; Wells, 2010)

Participants were then asked for each feared-for self characteristic chosen “How close do you currently feel you are to this characteristic?” The participant is asked to respond to this question using a 7 point likert scale where 1 = I am just like this and 7 = I am the complete opposite of this. This process is used to assess proximity, with a mean proximity score for all feared-for selves generated for each participant being used.

Participants were then asked to think about their feared-for selves overall and rate how likely they felt it was that these characteristics will describe them in the future, with the 7 point scale of 1, very unlikely to 7, very likely being used. This part of the measure is used to assess the participant’s expectancy in their possible feared-for self coming true. Finally, participants were asked how capable they felt they were in preventing this possible feared-for future coming true on a 7 point scale of 1, not at all capable to 7, very capable. This measure assesses the participant’s sense of efficacy in preventing the possible realisation of a possible feared-for future self.

2.4.7 Measures of proximity and enmeshment – Hoped-for self interview

To extend the work of Wells (2010) the Hoped-for self interview (Hooker & Kaus, 1994, Morley *et al.*, 2005) was used. The administration of this measure is similar to that of the Feared-for self interview. The questions asked of the participant are, however slightly different. Once 10 Hoped-for self characteristics are identified by the participant and recorded by the researcher the participant is then asked for each characteristic “Could you be like this with pain?” and asked to answer ‘Yes’ or ‘No’. As with the feared-for self interview participants are also asked “How close do you currently feel you are to this characteristic?” responding to this question using the 7 point likert scale discussed previously. Both enmeshment and proximity scores are generated in the same way as in the feared-for self interview. The rating of overall expectancy and efficacy was administered using the same methodology as in the feared-for self interview. The 25 hoped-for self characteristics used were generated from previous research in the field of chronic pain (Fogg, 2007; Goossens *et al.*, 2010). and were; Creative, Active, Being treated

as equal, Caring, Confident, Content, Easy going, Hard working, Friendly, Fit, Good listener, Good family member, Good sense of humour, Happy, Healthy, Helpful, Independent, Inventive, Optimistic, Sociable, Being patient, Outgoing, Positive, Wealthier, Understanding.

2.4.8 Measure of personal problem solving – The MEPS for Pain-PPS

Wells (2010) noted that one of the limitations of the MEPS *for Pain* is that participants may be more effective at solving scenario based problems than personal ones. A personal problem solving task based on the hoped-for self interview was therefore added to this research to explore this.

Pain-self enmeshment is observed within the hoped-for self interview when a participant provides a “no” response to a chosen characteristic (i.e., no I cannot be sociable with pain). These enmeshed pain-self characteristics were used to assess personal problem solving as they draw parallels with the MEPS *for Pain* scenarios; representing a participant’s personal principle goal which has been blocked by pain. Participants who did not identify any pain-self enmeshed characteristics were not included in this task. Participants who identified more than three enmeshed characteristics were asked to identify the three that were most important to them. Three enmeshed characteristics were used as a cut off to prevent participant fatigue.

Once the enmeshed characteristics had been identified participants were asked “Can you think of a way you could achieve this characteristic despite the pain?” for each characteristic. Their solutions were voice recorded and later transcribed. An adapted scoring procedure based on the MEPS *for Pain* was then used to analyse the data generated. The personal problem solving task and adapted MEPS *for Pain* scoring method will be referred to as the MEPS *for Pain-PPS* (MEPS *for Pain*-Personal Problem Solving) from this point forward. The MEPS *for Pain-PPS* included measures of assimilation and accommodation but not persistence. Persistence was removed as the personal problem solving task only identifies principle goals and not program goals, therefore persistence with a program could not be measured. Persistence prompts were also not given and therefore could not be measured. A category of “no solution generated” was also added to the MEPS

for *Pain-PPS* scoring categories to capture incidents where respondents were unable to generate a solution. The use of the *MEPS for Pain-PPS* scoring procedure supports a comparison to be made between participants' scenario based problem solving approach and their personal problem solving approach. The instructions for the *MEPS for Pain-PPS* task are included in Appendix 5.

2.4.9 Schedule of measure administration

Measures were administered in the order shown in Figure 7.

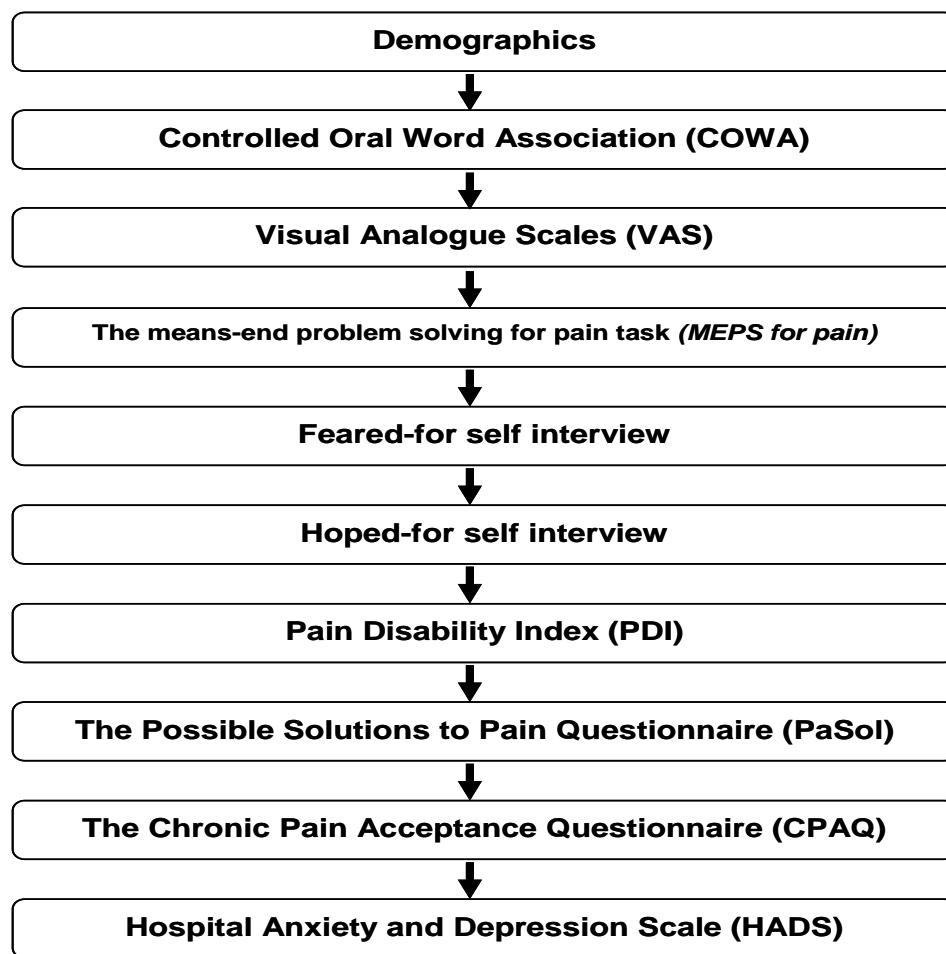


Figure 7, Schedule of measure administration.

2.5 Procedure

Participants were recruited from a primary care pain clinic in Leeds. Those fulfilling the inclusion criteria were provided with an information sheet by the researcher (or by a member of the pain team in the absence of the researcher). If the patient expressed an interest in participating in the study, they were given the option of being seen in the clinic or at home to complete the data collection process. Most participants were assessed at home.

At the beginning of the data collection process a brief overview of the data collection process was provided, and it was ascertained as to whether participants had read and understood the participant information sheet. If the patient agreed to participate in the study the process of gaining consent was commenced. Confidentiality was discussed and the patients' understanding of this was ascertained before they were asked to sign the consent form. The patient information sheet and consent form used in this research is presented in Appendix 7. Due to the length of the data collection process participants were reminded throughout the process that they could take a break should they be in any discomfort and that they could terminate the data collection process at any time. Participants were also reminded that participation in the study was voluntary and that they could withdraw at anytime with no effect on their treatment at the pain clinic.

2.6 Review and revision of the *MEPS for Pain* scoring procedure

The *MEPS for Pain* is currently being used in Leeds, UK and Gent, Belgium. The researchers from these two sites met and reviewed the scoring procedure of the *MEPS for Pain* based on the data collected.

The aim of the review was to increase the sensitivity of the assimilative and accommodative problem solving categories. Each scoring category developed was grounded in the work of Powers (1973) and Carver and Scheier (1998) to ensure the preservation of the theoretical grounds of the *MEPS for Pain*. The revised scoring structure is presented in Table 2 and links to the model of self regulation shown in Figure 8. The joint review resulted in three main changes to the measurement of assimilation within the *MEPS for Pain*. The first was in relation to the

controlling/removing pain item. In the MEPS *for Pain* scoring manual as developed by Wells (2010) this item was seen as the removal of pain to continue with the program (i.e., Frank took pain killers to remove pain and continued to play tennis). To increase the sensitivity of the item two further sub-categories were added namely; ignoring pain and adapting to pain. The definition of these sub-categories is shown in Table 2.2.

The second revision ensured persistence was accounted for as a scale in its own right, thus creating three measures, assimilation, accommodation, and persistence. This revision ensures that continued misdirected problem solving attempts are measured and not absorbed into the assimilative problem solving score. This adaptation was based on the limitations identified by Wells (2010) and is a measure of two factors. The first is the use of a persistence prompt by the researcher. A persistence prompt is given when the participant continues to attempt to solve the scenario by persistent attempts at pain removal. The second is an overall rating of the participant's response. This overall rating is based on the participant's continued persistence at pain removal solutions despite feedback that these are ineffectual and therefore represents misdirected problem solving.

The final revision was made to account for program abandonment without new program re-engagement. Nicholas and Asghari (2006) argued that activity engagement is a significant predictor of mood, with greater activity engagement being associated with improved mood. However, Wrosch *et al.* (2003) observed that when a goal is blocked, positive well-being was associated with a two step process of goal disengagement followed by new goal engagement. When goal disengagement occurred without new goal engagement poor well-being was observed. This therefore suggests that abandoning an unobtainable goal without engaging in a new goal is likely to result in distress for the patient. The inclusion of goal abandonment therefore allowed this to be captured. Although the scoring categories have been adapted to improve the sensitivity of the data, the process of scoring these items remained consistent with the original scoring method as defined by Wells (2010).

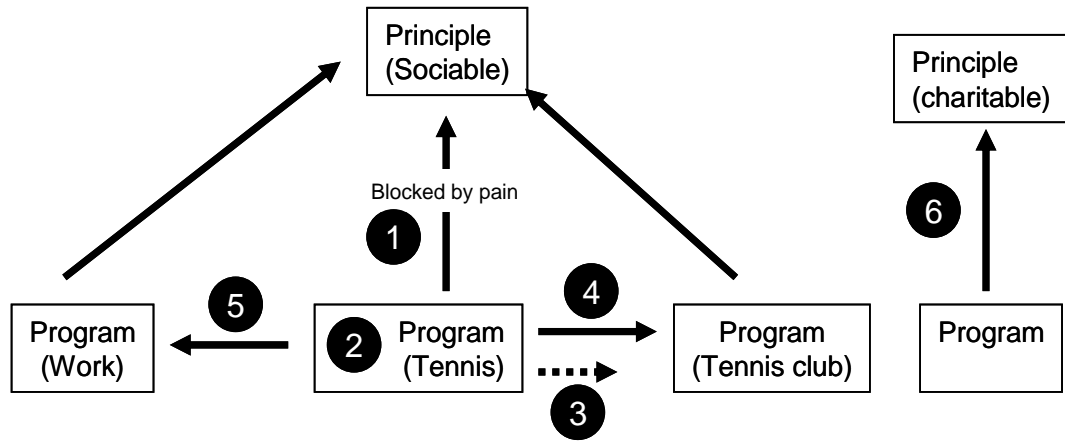


Figure 8 Revised coding structure as mapped onto Powers (1973) model.

Table 2 Revised *MEPS for Pain* scoring categories.

Assimilation		Possible response in relation to pain scenario 1-Frank
A) Controlling pain. - Figure 8, Point 1. Measures responses that serve to reduce pain or its impact	1) Attempts to remove or control pain.	Frank goes to the doctor to get pain killers
	2) Activities which serve to ignore or avoid pain.	He should stop nagging and ignore it
	3) Activities that serve to adjust /adapt to the pain.	Frank could play tennis when he has less pain
B) Program abandonment - Figure 8, Point 3. Measures program disengagement without new program re-engagement	1) Involves stopping an activity without offering an alternative program to engage with.	Frank needs to take up a different hobby
Persistence		
A) Persisting with the program - Figure 8, Point 2. Measures persistence in pain removal to complete the same program goal (one point only given)	1) Persistence with pain removal to complete the program goal (e.g. tennis)	Overall rating of the participants response
B) Persistence Prompt Measures persistence. Only 1 prompt given per pain scenario.	1) Is a prompt given by the researcher when the participant only provides controlling pain responses to the scenario.	Example prompt: “Frank did go and see his GP for pain relief, unfortunately it did not rid him of his pain”.
Accommodation		
A) Alternative program same context. - Figure 8, Point 4. - Measures program disengagement and new program engagement while retaining the original principle.	1) Involves choosing another activity in the same context, retaining the principle of being sociable,	He could become an umpire and therefore not play tennis but still see his friends
B) Alternative program different context - Figure 8, point 5 - Measure program disengagement and new goal engagement in a different context while retaining the principle.	1) Involves choosing another activity in a different context, retaining the principle of being sociable.	He could spend time with people at work
C) Alternative Principle - Figure 8, Point 6 - Measures principle disengagement and new principle engagement.	1) Involves choosing another principle to place effort.	Frank would do some charity work, helping others would make him feel better.

CHAPTER 3 – RESULTS

3.1 Introduction

This chapter explores the results of the study. The sample will first be described, following which, each test measure will be explored and correlations presented. Finally, the main hypotheses will be tested. The descriptive data, correlations, and hypothesis testing relating to the MEPS *for Pain*-Personal Problem Solving (MEPS *for Pain*-PPS) task will be presented at the end of the results section as this is a new measure. As this is a replication of a study undertaken by Wells (2010), the findings of Wells (2010) will be reported where possible, to compare the two samples.

3.2 Testing for normal distribution

The data were explored using histograms, estimates of skewness, kurtosis, and the Kolmogorov-Smirnov test. For variables found to be non-normal in their distribution, transformation was explored; however no satisfactory solution was found. Where variables were significantly non-normal, correlations were calculated using Kendall's Tau (τ), with Pearson's Correlation Coefficient (r) being used for normally distributed data.

3.3 The sample

3.3.1 Demographic data

Participants were recruited from one pain clinic in Leeds between November 2011 and March 2012. A total of 114 potential participants, who fulfilled the inclusion criteria for this research, were approached by either the researcher or the Clinical Nurse Specialist in the absence of the researcher. Of the potential 114 participants, 60 (53%) took part in the research. Of the remaining 54, 38 (33%) did not wish to take part, and 16 (14%) initially agreed to take part, however, subsequently declined. As data were not collected from participants until their appointment, information is not available for those who did not take part. Compared

to Wells (2010), the number of potential participants available for recruitment was smaller, 114 compared to 600, however, the response rate was higher, 53% compared to 11%.

The majority of participants were seen at home, with one being seen at the pain clinic. Interviews were anticipated to last around 90 minutes, however; this varied and ranged from 30 minutes to 135 minutes; the majority of interviews were completed within 50-90 minutes.

The sample included 20 (33.3%) males and 40 (66.7%) females. Thirty three participants were married ($n = 33$, 55%), 9 were single (15%), 7 were widowed (11.7%), 5 were divorced (8.3%), 5 were co-habiting (8.3%), and one was separated (1.7%). Occupational status for the sample varied with 14 being employed (23.3%), 21 unemployed (35%), 23 retired (38.3%), one student (1.7%) and one person describing their occupational status as a house wife (1.7%). Descriptive statistics for age, school leaving age, and verbal fluency score are presented in Table 3. Age was normally distributed ($D(60)$, 0.07, $p = ns$).

Table 3 Demographic data for age, school leaving age, and verbal fluency score.

	Minimum	Maximum	Mean	SD
Age	24	88	58.15	13.1
School leaving age (years).	12	30	15.83	2.2
Verbal fluency score	10	71	29.50	11.5

The mean age, and school leaving age for this sample is comparable to that of Wells (2010) where a mean age of 58.88 and mean school leaving age of 15.84 were observed. In this sample the mean verbal fluency score, as measured by the COWA, is slightly lower than that observed by Wells (2010; $M = 33.48$). Using the

qualitative descriptions proposed by Ruff *et al.* (1996) the sample mean of 29.50 would fall in the ‘low average’ range (range = 29 - 34). This is comparable to the mean of Wells (2010) which would fall in upper end of this range.

3.3.2 Diagnosis

All participants were asked for the diagnosis relating to the cause of their pain, with the diagnoses and frequencies shown in Table 4. For a large majority of participants more than one diagnosis was offered to explain their pain (range = 1 – 4; $M = 1.45$, $SD = 0.62$).

Table 4 Diagnoses.

	Frequency	Percentage
Arthritis	16	26.7
Osteoarthritis	11	18.3
Compressed Spinal Discs	9	15
Nerve Damage	8	13.3
Injury	8	13.3
Fibroyalgia	7	11.7
Back Damage - Unspecified	5	8.3
Osteoporosis	4	6.7
Spondylitis	3	5.0
Sciatica	2	3.3
Disc Degeneration	2	3.3
Hypermobility Syndrome	2	3.3
Spinal Stenosis	2	3.3
Spondylosis	2	3.3
Dehydrated Spinal Discs	1	1.7
Hereditary Neuropathy	1	1.7
Unknown	5	8.3

3.3.3 Sites of pain

Participants were asked to indicate the sites of their pain. Participants indicated a range of sites (range = 1 – 6; $M = 2.67$, $SD = 1.43$). Table 5 shows the

various sites reported and their frequencies. The most common sites of pain for participants were their Legs (48.3%), Back (46.7%) and Neck (28.3%).

3.3.4 *Treatments received*

Participants were asked to provide details of the treatments they had received since the onset of their pain. A range of treatments were reported by participants (range = 1 – 8; M = 4.62; SD = 1.82). Table 6 shows the treatments participants reported to have received and the frequency of these treatments. Treatments reported by fewer than 5 participants have been placed in the category ‘other’. The other category includes treatments such as; Osteopathy, Radio Frequency, Pilates, Aromatherapy, the use of aids/supports, Reflexology, and the use of relaxation techniques. The most commonly occurring treatments received were oral analgesics (100%), Physiotherapy (73.3%), and injections (70%). This is the same finding as Wells (2010).

Table 5 Sites of pain.

	Frequency	Percentage
Legs	29	48.3
Back	28	46.7
Neck	17	28.2
Hips	15	25.0
Lower Back	14	23.3
Knee	14	23.3
Hands	11	18.3
Shoulders	7	11.7
Head	7	11.7
Feet	7	11.7
Arms	6	10.0
Full Body	5	8.3

Table 6 Treatments received.

	Frequency	Percentage
Oral Analgesics	60	100.0
Physiotherapy	44	73.3
Injections	42	70.0
TENS	31	51.7
Analgesics in Patch form	31	51.7
Surgery	20	33.3
Acupuncture	20	33.3
Hydrotherapy	8	13.3
Chiropractor	6	10.0
Other	18	30.6

3.4 Pain measures

3.4.1 Pain duration

Pain duration for the sample ranged from 1 year to 45 years ($M = 15.14$, $SD = 11.84$). This variable was significantly non-normally distributed ($D(60) = 0.18$, $p < .001$). The mean pain duration was comparable to the mean of 14 years and 6 months observed by Wells (2010). Pain duration and age were not significantly correlated ($\tau = .093$, $p = ns$), a finding not observed by Wells (2010).

3.4.2 Pain intensity

Participants' pain intensity was measured using the VAS (range = 0-100), with higher scores representing greater pain intensity. The rating of pain intensity at its highest, lowest, and usual levels are shown in Table 7. The mean VAS score for the sample was 50.9 ($SD = 1.49$). This was lower than the mean of 57.6 ($SD = 14.33$) observed by Wells (2010). The highest ($D(60)$, 0.14, $p < .005$), and lowest ($D(60)$, 0.14, $p < .005$) VAS responses were significantly non-normally distributed. The usual ($D(60)$, 0.07, $p = ns$) and mean ($D(60)$, 0.07, $p = ns$) VAS responses were normally distributed.

Pain duration was not significantly correlated with highest ($\tau = .048$, $p = \text{ns}$), lowest ($\tau = -.106$, $p = \text{ns}$), usual ($\tau = -.006$, $p = \text{ns}$), or mean ($\tau = .052$, $p = \text{ns}$) VAS responses. Age was also not significantly correlated with these variables. These findings are different to those observed by Wells (2010) where highest, lowest, and mean VAS variables were correlated with pain duration, and age was observed to be significantly negatively correlated with lowest VAS.

Table 7 Highest, Lowest, and Usual VAS means and standard deviations.

	Mean	SD
Highest	80.8	1.15
Lowest	30.4	2.13
Usual	50.7	1.90

3.4.3 Pain Disability Index (PDI)

PDI is a measure of pain disability, with higher scores representing greater disability. The mean PDI for this sample was 45.8 ($SD = 13.8$, range = 10-70). This was higher than the mean of 36.02 observed by Wells (2010). The PDI variable was normally distributed ($D(60)$, 0.72, $p = \text{ns}$). PDI was not significantly correlated with pain duration, however, it was significantly correlated with the highest VAS variable ($\tau = 0.19$, $p < 0.05$), and negatively correlated with age ($r = -0.29$, $p < 0.05$). The finding that PDI and age were negatively correlated is consistent with findings observed by Wells (2010).

3.4.4 Chronic Pain Acceptance Questionnaire

The CPAQ measures acceptance of chronic pain, and contains two subscales. Higher scores represent greater acceptance. All CPAQ variables were normally distributed. Descriptive data for the CPAQ is presented in Table 8. The mean activity engagement and pain willingness variables were lower than the mean

of 38.30, and 19.80 reported by Wells (2010). The total acceptance score could not be compared as this was not reported by Wells (2010).

Table 8 CPAQ means and standard deviations.

	Activity Engagement	Pain Willingness	Total Acceptance
Mean	37.7	16.2	54.0
N	60	60	60
SD	15.1	9.0	19.0
Distribution	D = .089, p = ns	D = .077, p = ns	D = .068, p = ns
<i>Correlations</i>			
Age	.435 ^{r**}	-.046	.322 ^{r*}
Pain Duration	.192 ^{τ*}	-.014	.169
VAS Highest	-.155	-.115	-.192 ^{τ*}
VAS Lowest	-.160	-.116	-.196 ^{τ*}
VAS Usual	-.305 ^{r*}	-.125	-.300 ^{r*}
VAS Mean	-.233	-.188	-.274 ^{r*}
PDI	-.560 ^{r**}	-.315 ^{r*}	-.593 ^{r**}

τ = Kendall's Tau

r = Pearson's Correlation Coefficient

* = Correlation is significance at 0.05 level

** = Correlation is significance at 0.01 level

Table 8 shows that activity engagement is correlated with age, and pain duration. Activity engagement is also negatively correlated with VAS usual, and PDI. Pain willingness is negatively correlated with PDI. Total acceptance is correlated with age, all VAS variables, and PDI. As Wells (2010) did not explore these variables, no comparison is possible.

3.5 Measure of affect

Affect was measured by the HADS. Both the mean depression score for the sample (M = 10.40; SD = 5.28), and the mean anxiety score (M = 8.28, SD = 4.43) were within the borderline range (Zigmond and Snaith, 1983). The mean total distress score for the sample, calculated by adding the anxiety and depression scores together

for each participant, was 18.68 (SD = 9.02). When comparing these means to those observed by Wells (2010), the depression and total distress scores were higher (depression = 6.72, distress = 16.07), and the anxiety score was lower (M = 9.34).

The HADS anxiety variable was normally distributed (D(60), 0.10, $p = ns$), however, the HADS depression (D(60), 0.12, $p < 0.05$) and total distress (D(60), 0.14, $P < 0.05$) variables were both significantly non-normal.

Descriptive data for the HADS and correlations with age, pain duration, PDI, and CPAQ variables are shown in Table 9. Age and CPAQ variables were significantly negatively correlated with anxiety, depression, and total distress. PDI was significantly correlated with anxiety, depression, and total distress. This is a finding that is different to that observed by Wells (2010), where no correlations were observed between age, PDI, and affect measures.

Table 9 Descriptive data for the HADS and correlations with age, pain duration, PDI, and CPAQ variables.

	Depression	Anxiety	Total Distress
Mean	10.40	8.28	18.63
SD	5.28	4.43	9.02
Correlations			
Age	-.225 τ^*	-.317 r^{**}	-.251 τ^{**}
Pain Duration	-.149	-.054	-.129
PDI	.499 τ^{**}	.629 r^{**}	.446 τ^{**}
CPAQ			
Activity Engagement	-.529 τ^{**}	-.339 r^{**}	-.441 τ^{**}
Pain Willingness	-.250 τ^{**}	-.289 r^{**}	-.306 τ^{**}
Total Acceptance	-.550 τ^{**}	-.410 r^{**}	-.510 τ^{**}

τ = Kendall's Tau

r = Pearson's Correlation Coefficient

* = Correlation is significance at 0.05 level

** = Correlation is significance at 0.01 level

3.6 The feared-for self

The feared-for self interview asks participants to identify up to ten feared-for self characteristics from a pre-generated collection of 25 possible characteristics. Participants are also advised that should they feel their feared characteristics are not represented in the 25 characteristics offered, they can add their own. Two participants of the 60 interviewed added their own characteristics, these were; ‘being a burden’, and ‘ostracised’. The mean number of characteristics chosen was 7.78 (SD = 2.60, range 1-10). This was a comparable finding to that of Wells (2010; M = 7.36, SD = 2.73). The number of feared-for characteristics chosen variable was significantly non-normal (D(60), .210, $p < 0.01$). The frequency of feared-for characteristics were chosen is shown in Figure 9. Correlations were performed between the numbers of feared-for characteristics chosen, school leaving age and verbal fluency score. There was no association found between the number of feared-for characteristics chosen and school leaving age ($\tau = .125$, $p = \text{ns}$) or verbal fluency score ($\tau = .049$, $p = \text{ns}$). This finding was also observed by Wells (2010). The feared-for self data is presented in Table 10. The mean proximity, and expectancy scores were comparable to the mean of 4.07, and 4.17 observed by Wells (2010). Both the mean efficacy, and enmeshment scores observed were lower than the means of 4.44, and 0.61 observed by Wells (2010). The proximity variable was normally distributed (D(60), .078 $p = \text{ns}$), however, the expectancy (D(60), .117 $p < 0.001$), efficacy (D(60), .119 $p < 0.05$), and enmeshment (D(60), .143 $p < 0.005$) variables were significantly non-normal.

Table 10 Feared-for self data.

	Feared-for selves chosen	Proximity	Expectancy	Efficacy	Enmeshment
Mean	7.36	4.05	4.52	3.68	0.39
SD	2.60	1.40	1.77	1.81	0.33
Range	1-10	1.3-7	1-7	1-7	0-1

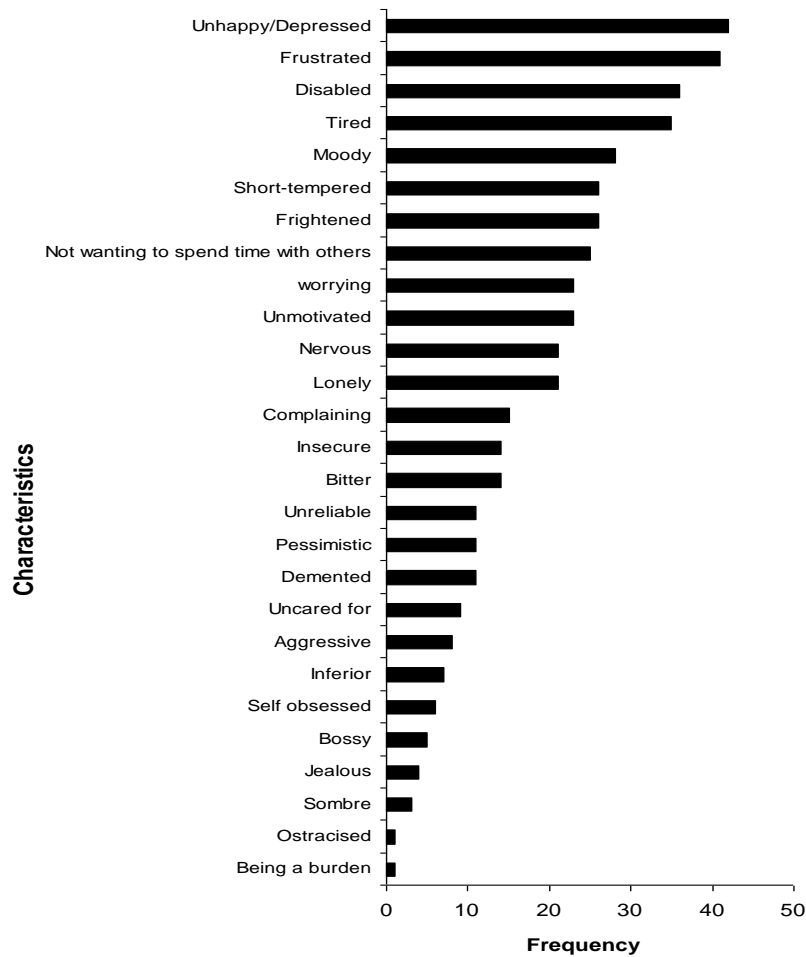


Figure 9 Frequency of feared-for self characteristics chosen.

3.6.1 Correlation between feared-for self, pain, and affect measures

Feared-self enmeshment did not correlate with any pain or affect measure. Feared-self proximity, which measures participants' mean distance from their feared-self characteristics, correlated with age ($r = .320$, $p < 0.05$) and CPAQ ($r = .372$, $p < 0.01$), and was negatively correlated with VAS mean ($r = -.268$, $p < 0.05$), PDI ($r = -.320$, $p < 0.05$), anxiety ($r = -.355$, $p < 0.01$), depression ($\tau = -.264$, $p < 0.01$) and total distress ($\tau = -.257$, $p < 0.01$). The results show that age and

acceptance of pain increase as participants get further away from their feared self, while perceived pain intensity, anxiety, depression and overall distress reduce.

Feared-self expectancy, which measures perceived likelihood of feared-self characteristics coming true, correlated with VAS mean ($\tau = .229$, $p < 0.05$), PDI ($\tau = .322$, $p < 0.01$), anxiety ($\tau = .216$, $p < 0.01$), depression ($\tau = .437$, $p < 0.01$) and total distress ($\tau = .354$, $p < 0.01$), and negatively correlated with CPAQ ($\tau = -.358$, $p < 0.01$). The results show that the perceived likelihood of the feared self being realised is associated with an increase in perceived pain intensity, disability and distress. A reduced likelihood of the feared self being realised is associated with acceptance of chronic pain.

Feared-self efficacy, which measures perceived capability of preventing characteristics from coming true, correlated with CPAQ ($\tau = .228$, $p < 0.01$). The number of feared-self characteristics chosen, correlated with anxiety ($\tau = .252$, $p < 0.01$), depression ($\tau = .309$, $p < 0.01$), and total distress ($\tau = .263$, $p < 0.01$), and negatively correlated with CPAQ ($\tau = -.360$, $p < 0.01$), and age ($\tau = -.206$, $p < 0.05$). The results show that participants' perceived capability of preventing their feared self from being realised was associated with acceptance of chronic pain, while the more feared-for self characteristics participants chose the greater anxiety, depression and total distress they experience. Acceptance of chronic pain and age were associated with less feared-self characteristics being chosen.

3.7 The Hoped-for self

The hoped-for self interview asks participants to identify up to ten hoped-for characteristics from a collection of 25 possible characteristics. Like the feared-for self interview, participants are allowed to generate their own characteristics if they wish. None of the 60 participants generated their own hoped-for self characteristics. The mean number of characteristics chosen was 9.23 (SD, 1.40; Range = 3-10). As Wells (2010) did not use the hoped-for self interview, a comparison is not possible.

The frequency hoped-for characteristics were chosen is shown in Figure 10. Correlations were performed between the numbers of hoped-for characteristics chosen, school leaving age and verbal fluency score. There was no association

found between the number of hoped-for characteristics chosen and school leaving age ($\tau = .011$, $p = ns$) or verbal fluency score ($\tau = .105$, $p = ns$). The hoped-for self data is presented in Table 11.

Table 11 Hoped-for self data.

	Hoped-for characteristics chosen	Proximity	Expectancy	Efficacy	Enmeshment
Mean	9.23	3.32	5.12	4.49	0.37
SD	1.40	1.45	1.63	1.70	0.33
Range	3 – 10	1 - 6.2	1 – 7	1 – 7	0 - 1

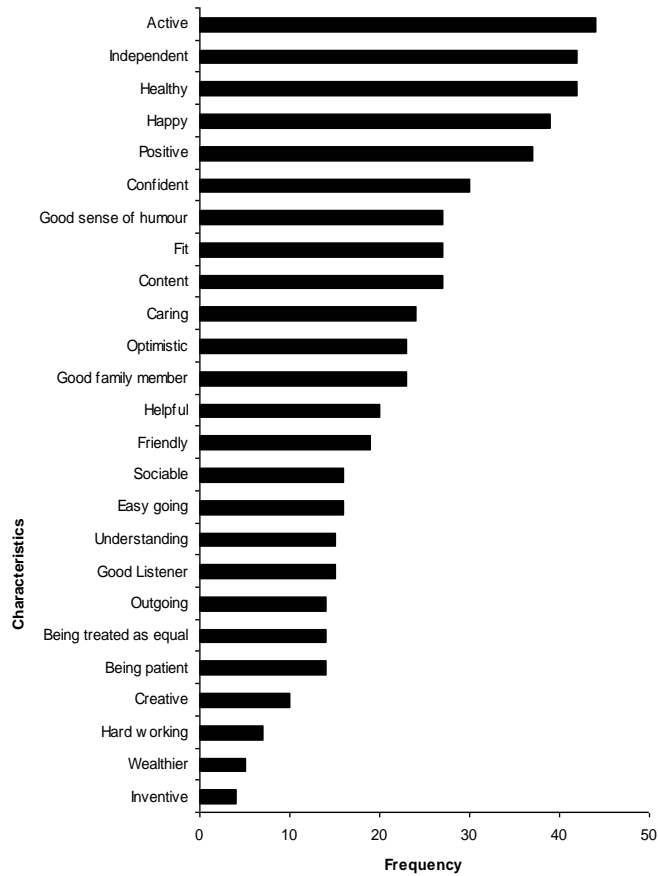


Figure 10 Frequency of hoped-for self characteristics chosen.

3.7.1 Correlation between hoped-for self, pain, and affect measures

Hoped-self enmeshment correlated with PDI ($\tau = .307$, $p < 0.01$), anxiety ($\tau = .262$, $p < 0.01$), depression ($\tau = .495$, $p < 0.01$), and total distress ($\tau = .381$, $p < 0.01$). Enmeshment was negatively correlated with age ($\tau = -.311$, $p < 0.01$), pain duration ($\tau = -.221$, $p < 0.05$), and CPAQ ($\tau = -.341$, $p < 0.01$). The results show that greater enmeshment of the hoped self is associated with greater disability and distress, while less enmeshment was associated with age, pain duration and acceptance of chronic pain.

Hoped-self proximity, which measures participants' mean distance from their hoped-self characteristics, correlated with PDI ($\tau = .215$, $p < 0.05$), anxiety ($\tau = .288$, $p < 0.01$), depression ($\tau = .371$, $p < 0.01$), and total distress ($\tau = .330$, $p < 0.01$), and negatively correlated with CPAQ ($\tau = -.230$, $p < 0.05$). The results show that as participants move away from their hoped self, disability and distress increases. Being in close proximity to what one hoped to be is associated with greater acceptance of chronic pain.

Hoped-self expectancy, which measures perceived likelihood of hoped self characteristics coming true, negatively correlated with anxiety ($\tau = -.214$, $p < 0.05$), depression ($\tau = -.230$, $p < 0.05$), and total distress ($\tau = -.239$, $p < 0.05$). As perceived likelihood that the hoped self can be realised increases, distress reduces.

Hoped-self efficacy, which measures perceived capability of making characteristics coming true, correlated with CPAQ ($\tau = .285$, $p < 0.01$), and negatively correlated with PDI ($\tau = -.205$, $p < 0.05$), depression ($\tau = -.319$, $p < 0.01$), and total distress ($\tau = -.193$, $p < 0.05$). As participants feel more capable of realising their hoped self, acceptance of chronic pain increases, while disability and distress reduces.

The number of hoped-self characteristics chosen, correlated with VAS mean ($\tau = .209$, $p < 0.05$).

3.8 Problem solving attitudes – The PaSol

The PaSol is a measure of problem solving attitudes. The scale can be used to provide an assimilative problem solving score by combining sub items, with higher

scores representing a greater attitude towards assimilative problem solving. It was this method of calculating assimilation which was used by Wells (2010) as an outcome measure. Descriptive data for the PaSol subscales and assimilative problem solving is shown in Table 12. The means and standard deviations reported by Wells (2010) are shown in this table for comparison.

Table 12 Descriptive data for the PaSol.

	Mean	SD	Distribution
Solving Pain Scale (Wells, 2010)	19.70 (19.18)	5.00 (5.09)	(D(60), 0.18, $p < 0.00$)
Meaningfulness of Life Despite Pain Scale (Wells, 2010)	20.07 (22.47)	5.67 (5.63)	(D(60), 0.08, $p = ns$)
Acceptance of the Insolubility of Pain Scale (Wells, 2010)	11.63 (10.23)	4.36 (5.44)	(D(60), 0.11, $p = ns$)
Belief in a Solution Scale (Wells, 2010)	7.47 (6.14)	3.92 (3.84)	(D(60), 0.14, $p < 0.05$)
Assimilation Score (Wells, 2010)	34.57 (34.53)	9.58 (11.40)	(D(60), 0.09, $p < 0.01$)

The PaSol assimilation score was significantly correlated with PDI ($\tau = 0.27$, $p = 0.01$), Anxiety ($\tau = 0.36$, $p = 0.01$), Depression ($\tau = 0.42$, $p = 0.01$), and total distress ($\tau = 0.43$, $p = 0.01$). The PaSol assimilation score was negatively correlated with age ($\tau = -0.18$, $p = 0.05$), pain duration ($\tau = -0.30$, $p = 0.01$), and CPAQ ($\tau = -0.43$, $p = 0.01$).

3.9 The MEPS *for Pain*

The Means End Problem Solving for Pain task (MEPS *for Pain*) was developed by Wells (2010), and is a measure of scenario based assimilative and accommodative problem solving. Respondents are presented with pain related scenarios and their responses are coded as per the framework described in Chapter 2. Assimilative, Accommodative, and Persistence scores are then generated. The assimilative score is generated by summing all pain removal items. The persistence score is generated by summing the number of persistence prompts given by the researcher with the number of persistence responses given. Accommodative score is generated by summing the number of alternative items generated. All 60 participants completed the MEPS *for Pain*.

3.9.1 Inter-rater reliability for MEPS *for Pain*

Wells (2010) observed a range of inter-rater reliability of between 0.62 – 0.90 when using the MEPS *for Pain*. Given the MEPS *for Pain* scoring items have been revised within the current study, and that it was recommended by Wells (2010) that more training of raters was required, inter-rater reliability were revisited.

All transcripts were rated by the main researcher (SD) and an additional rater unfamiliar with the study and rating method (PP). PP was trained in the MEPS *for Pain* scoring method during a teaching session. This teaching session also included the joint rating of 6 randomly selected cases by SD and PP. The Teaching session lasted for two hours. Following completion of training PP and SD rated the remaining 54 cases in isolation.

The remaining 54 cases were split into three blocks based on the order in which participants were interviewed (block A = 1-20, Block B = 21-40, Block C = 41-60). The order in which participants in each block were rated was randomised for each rater. This means that the order in which participants were rated is independent of the order in which they were tested. This process resulted in two sets of scores being generated for each participant.

Intraclass correlation coefficients (ICC) were calculated to assess inter-rater reliability. McGraw and Wong (1996) indicate that a two way ICC model should be

used in cases where there is variance in the item being measured, with average measurements being used when there is variance in the raters. Based on the work of McGraw and Wong (1996), a two way average measurements ICC was used to assess inter-rater reliability. Absolute agreement was used as opposed to consistency as indicated by McGraw and Wong (1996) as this ensures that when scores differ they are seen as disagreement.

The literature does not provide specific direction as to the assessment of consistency between raters; however, the closer the ICC is to 1, the greater the consistency. The ICC for Assimilative score was 0.96, Accommodative score was 0.93, and Persistence score was 0.88, indicating a strong inter-rater consistency. The ICC observed in the currently study are therefore greater than those observed by Wells (2010). Based on these findings, the average Assimilative, Accommodative, and Persistence scores were calculated and used for subsequent analyses.

3.9.2 Summary data

The mean, standard deviation, and range for assimilative, accommodative, and persistence score is presented in Table 13. Wells (2010) reported a lower mean assimilative score of 6.22 (SD = 6.33), and a higher mean accommodative score of 4.45 (SD = 2.25). Table 13 also displays the mean, standard deviation, and range for each of the items which are summed to generate each of these scores. This is to address some of the limitations identified in the work of Wells (2010). Table 13 shows that in the sample, assimilative problem solving approaches were more frequent than accommodative. The use of pain removal solutions were more frequent than other assimilative approaches, followed by adjusting or adapting to pain. This shows that participants tried to remove the pain and/or employ pain management adaptations in order to achieve their goals. Within the accommodative score, alternative same context solutions were most frequent, with alternative principles being less frequently used. This shows that participants more frequently attempted to change the program goal but retain the context, than find an alternative principle goal to engage with.

The assimilative score ($D(60)$, 0.162 $p < 0.01$), accommodative score ($D(60)$, 0.176 $p < 0.01$), and persistence score ($D(60)$, 0.153 $p < 0.01$), were all significantly non-normal.

Table 13 Mean, standard deviation, and range for assimilative, accommodative and persistence scores, and sub-items.

	Mean	SD	Range
Assimilative Score	11.91	6.70	3-35
<i>Controlling pain</i>			
Pain removal	5.83	4.77	0-19
Ignoring/avoiding pain	1.25	1.17	0-5
Adjust/adapting to pain	4.05	3.48	0-16
<i>Program abandonment</i>	0.92	1.10	0-4
Persistence Score	2.23	1.56	0-7
Persistence prompts given	1.70	1.19	0-4
Persistence with program	0.53	0.89	0-3
Accommodative Score	3.39	3.19	0-13
Alternative same context	2.87	2.36	0-10
Alternative different context	0.82	1.28	0-5
Alternative principle	0.25	0.72	0-4

3.9.3 Correlations between the MEPS for Pain, pain, and affect measures

The accommodative score was negatively correlated with age ($\tau = -.185$, $p < 0.05$), but with none of the pain or affect measures. The persistence score was correlated with age ($\tau = .218$, $p < 0.05$), but with none of the pain or affect measures. The assimilative score was not correlated with any of the pain or affect measures.

3.9.4 Correlations between the MEPS for Pain and the PaSol

For the MEPS for Pain, the accommodative score was negatively correlated with the persistence score ($\tau = -.243$, $p < 0.05$). Persistence score, and assimilative score were correlated ($\tau = .525$, $p < 0.01$). Accommodative score and assimilative

score were not correlated ($\tau = -.035$, $p = ns$). Table 14 shows the relationship between the PaSol items and the MEPS *for Pain* items. As all MEPS for pain items were significantly non-normal, Kendall's Tau was used. Table 14 also shows the findings of Wells (2010) along side the findings of the current study.

Table 14 Correlations between the MEPS *for Pain* and PaSol.

	MEPS for Pain		
	Assimilative	Persistence	Accommodative
Solving Pain Scale	-.170	-.163	-.086
<i>Wells (2010)</i>	.208*		-.94
Meaningfulness of Life Despite Pain Scale	.034	-.001	.082
<i>Wells (2010)</i>	-.075		.130
Acceptance of Insolubility of Pain Scale	-.022	-.014	.047
PaSol <i>Wells(2010)</i>	-.279**		.180*
Belief in a Solution Scale	-.037	0.82	-.110
<i>Wells (2010)</i>	.198*		-.059
Assimilation Score	-.144	-.135	-.032
<i>Wells (2010)</i>	.245**		-.154

* = Correlation is significance at 0.05 level

** = Correlation is significance at 0.01 level

Table 14 shows that, in this sample, none of the PaSol items and the MEPS *for Pain* items were correlated, and that the direction of the relationship between PaSol items and the MEPS *for Pain* items was not always as expected. Therefore, in this sample participants' attitudes to problem solving are not related to the problem solving approaches they use when presented with a scenario based problem.

3.10 Hypothesis Testing

3.10.1 Hypothesis 1:

Individuals who are closer in proximity to their feared-for self and more enmeshed are more likely to use assimilative problem solving approaches.

The PaSol assimilative score was negatively correlated with proximity to the feared-for self ($r = -.286$, $p < 0.05$); as participants get closer to their feared-self, assimilative score increases. The PaSol assimilative score did not correlate with enmeshment ($\tau = .041$, $p = ns$). The assimilative score, accommodative score, and persistence score, as generated by the MEPS *for Pain* were not significantly correlated with either feared-self proximity or enmeshment. All correlations are shown in Table 15.

Table 15 Hypothesis testing correlations for Fear-for self, PaSol and MEPS *for Pain* measures.

	Feared-for Self	
	Proximity	Enmeshment
PaSol Assimilation score	-.286 ^{r*}	.041 ^τ
MEPS <i>for Pain</i>		
Assimilative score	-.070 ^τ	-.049 ^τ
Persistence score	.012 ^τ	.095 ^τ
Accommodative score	-.120 ^τ	.061 ^τ
^τ = Kendall's Tau * = Correlation is significance at 0.05 level ^r = Pearson's Correlation Coefficient ** = Correlation is significance at 0.01 level		

The hypothesis is therefore partially supported when using the PaSol assimilative score but is unsupported when using the MEPS *for Pain*. This finding is different to that observed by Wells (2010) where significant correlations between PaSol assimilative score, proximity, and enmeshment were observed. Wells (2010) also observed significant correlations between assimilative and accommodative scores, as measured by the MEPS *for Pain*, proximity, and enmeshment.

3.10.2 Hypothesis 2:

Individuals who are closer in proximity to their hoped-for self and less enmeshed are more likely to use accommodative problem solving approaches.

The PaSol assimilative score was correlated with proximity to the hoped-for self ($\tau = .281, p < 0.01$). As participants get closer to their hope-for self, assimilative score reduces. The PaSol assimilative score was also correlated with enmeshment ($\tau = .351, p < 0.01$). As hoped-self enmeshment increases, assimilative score increases. The assimilative, accommodative, and persistence scores, as generated by the MEPS *for Pain*, did not correlate with hoped-for proximity or enmeshment.

Hypothesis 2 is therefore supported by the PaSol assimilative score, but not by the MEPS *for Pain*. As Wells (2010) did not use the hoped-for self interview a comparison is not possible.

Table 16 Hypothesis testing correlations for Hoped-for self, PaSol and MEPS *for Pain* measures.

	Hoped-for Self	
	Proximity	Enmeshment
PaSol Assimilation score	.281 ^τ	.351 ^τ
MEPS <i>for Pain</i>		
Assimilative score	.114 ^τ	.067 ^τ
Persistence score	.185 ^τ	.013 ^τ
Accommodative score	-.093 ^τ	-.019 ^τ

τ = Kendall's Tau

r = Pearson's Correlation Coefficient

* = Correlation is significance at 0.05 level

** = Correlation is significance at 0.01 level

3.11 MEPS *for Pain*-Personal Problem Solving task

The MEPS *for Pain* measures scenario based problem solving rather than personal problem solving attempts. As an attempt to address this issue a measure of personal problem solving was added to the current study. This measure was based on the participant's generation of enmeshed hoped-for self characteristics, and requires participants to explain how they could achieve this blocked principle in the presence of pain. The measure of personal problem solving uses an adapted form of the MEPS *for Pain* scoring method, the MEPS *for Pain*-PPS, to score participants' responses. The MEPS *for Pain*-PPS measure therefore allows an assimilative score, and an accommodative score to be generated. A persistence score is not generated as only the principle goal is identified, not a program goal, preventing persistence with a program from being measured, as well as the use of persistence prompts. A No Solution score was added to the MEPS *for Pain*-PPS scoring procedure to capture the participant's inability to generate a solution.

Of the 60 participants, 14 participants were not included in the analysis as they had no enmeshed hoped-for self characteristics generated. Six participants generated 1 enmeshed hoped-for self, nine generated 2 enmeshed hoped-for selves, and thirty one participants generated the maximum of 3 enmeshed hoped-for selves. A total of forty-six participants were therefore included in analysis of the personal problem solving measure.

3.11.1 *Inter-rater reliability*

A two way, average measurement ICC testing for absolute agreement was used to explore inter-rater consistency. The ICC for the no solution score was 0.96, the assimilative score was 0.93, and the accommodative score was 0.92. These findings indicate a strong inter-rater consistency for all scores.

3.11.2 *Summary data*

The frequency of individually nominated enmeshed hoped-for selves chosen is shown in Figure 11. The weighted mean, standard deviation, and range for No solution, assimilative, and accommodative score is presented in Table 17. When

exploring the data a weighted mean has been used to account for the variation in the number of hoped-for self characteristics generated by each participant (Range 1-3). The assimilative score ($D(46)$, 0.215 $p < 0.001$), and accommodative score ($D(46)$, 0.39 $p < 0.001$) were significantly non-normal.

Table 17 Mean, standard deviation, and range for No solution, Assimilative, and Accommodative score.

	Weighted mean	SD	Range
No Solution score	0.27	0.33	0-1
Assimilative score	1.04	1.03	0-3.75
Accommodative score	0.75	0.85	0-3

3.11.3 Exploration of No solution score

As the personal problem solving task measures attempts participants make to solve blocked principle goals, it is important to explore where respondents were unable to generate either an assimilative or accommodative solution. The participants in the personal problem solving task ($n = 46$) generated 118 enmeshed hoped-for characteristics, with no solution being generated for 35 (41.3%) of these enmeshed characteristics. Table 18 shows a cross-tabulation between the number of enmeshed hoped-for self characteristics generated and the frequency of respondents unable to generate a solution. In Table 18, the shaded area shows those participants who were unable to generate a solution for any of the enmeshed hoped-self characteristics they personally identified.

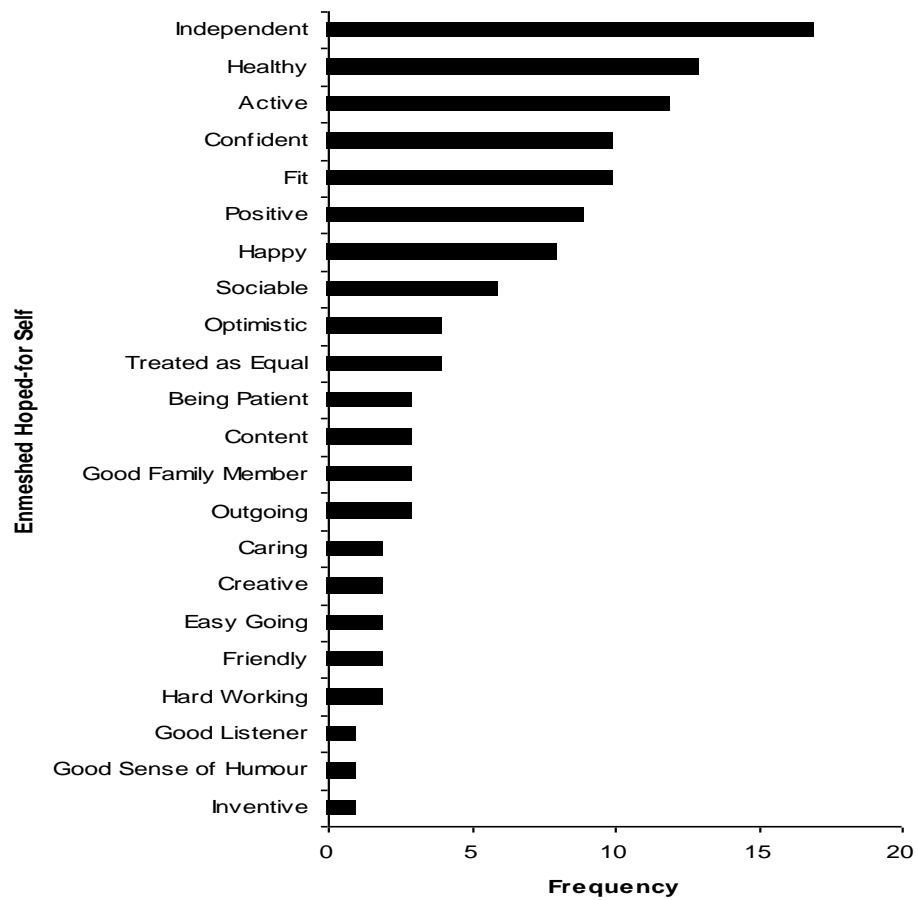


Figure 11 Frequency of enmeshed hoped-for selves chosen.

Table 18 No solution generated by number of enmeshed hoped-for selves generated.

		Frequency of 'No solution' generated		
		1	2	3
Number of enmeshed Hoped-for characteristics	1	1		
	2	3	2	
	3	10	6	1
	Total	14	8	1

3.11.4 Hypothesis 1:

Individuals who are closer in proximity to their feared-for self and more enmeshed are more likely to use assimilative problem solving approaches.

Assimilative score as measured by the MEPS for Pain-PPS was not significantly correlated with feared-self proximity ($\tau = .067$, $p = \text{ns}$) or feared-self enmeshment ($\tau = .095$, $p = \text{ns}$). Accommodative score as measured by the MEPS for Pain-PPS was not significantly correlated with feared-self proximity ($\tau = .005$, $p = \text{ns}$) or feared-self enmeshment ($\tau = .007$, $p = \text{ns}$). Hypothesis 1 is not supported for the 46 participants who completed the personal problem solving task.

3.11.5 Hypothesis 2:

Individuals who are closer in proximity to their hoped-for self and less enmeshed are more likely to use accommodative problem solving approaches.

Assimilative score as measured by the MEPS for Pain-PPS was not correlated with hoped-self proximity ($\tau = .264$, $p = \text{ns}$), however, was correlated with hoped-self enmeshment ($\tau = .306$, $p < 0.01$). As hoped-self enmeshment increases, the use of assimilative problem solving approaches increase.

Accommodative score as measured by the MEPS for Pain was not correlated with hoped-self proximity ($\tau = -.003$, $p = \text{ns}$), or hoped-self enmeshment ($\tau = .133$, $p = \text{ns}$).

Hypothesis 2 is therefore partially supported by the MEPS for Pain-PPS assimilative score, however, not supported by the MEPS for Pain-PPS accommodative score for the 46 participants who completed the personal problem solving task.

CHAPTER 4 – DISCUSSION

4.1 Introduction

The main aims of this research were to explore the relationship between two aspects of the possible future self, namely the feared and hoped-for self, and problem solving in chronic pain. This research represents a replication of the work of Wells (2010); however, the current research extends this work by exploring the relationship between the hoped-for self and problem solving. By using the hoped-for self interview, the current research, not only allows for the relationship between hoped-for self and problem solving to be explored, it extends the work of Wells (2010) further by developing a means of measuring personal problem solving attempts in relation to principle goals blocked by pain.

Based on the work of Wells (2010), and following an extensive review of the literature, two specific hypotheses were developed. First, it was hypothesised that chronic pain patients who were closer to their feared-self and more enmeshed would be more likely to use assimilative problem solving approaches. Second, it was hypothesised that chronic pain patients who were closer to their hoped-self and less enmeshed would be more likely to use accommodative problem solving approaches.

A single group, multiple measures, observational design was used to explore the research hypotheses. This design was used by Wells (2010) and has been used previously in the literature to explore similar phenomena in chronic pain populations (Morley *et al.*, 2005; Sutherland and Morley, 2008). Sixty participants were recruited from a pain clinic in Leeds. Pain and affect measures were used within this research to measure pain intensity, pain disability, pain acceptance and distress. To test the hypotheses of the research, the Pain Solutions Questionnaire (PaSol) and the Means-End Problem Solving for Pain task (MEPS *for Pain*) were used to measure problem solving, with the feared-for and hoped-for self interviews being used to measure possible future selves. To explore the relationship between problem solving and possible future selves' correlations were performed.

To extend the work of Wells (2010) a personal problem solving task was developed, the *MEPS for Pain-PPS*. The research hypotheses were then explored using the results from this task.

The remainder of this chapter will explore the results relating to the main hypotheses, following which a review of the findings observed from the personal problem solving task are explored. Next the other relevant findings of the research are explored, following which the limitations and the clinical implications of the study are identified. Finally, areas for future research will be suggested.

4.2 Research Hypotheses

4.2.1 Main Hypothesis Testing

Hypothesis 1 explored proximity to, and enmeshment of, the feared-for self and problem solving. A significant negative correlation between PaSol assimilative score and proximity to the feared-for self was observed, indicating that as participants get closer to their feared-self, assimilative score increases. PaSol assimilative score was, however, not correlated with feared-self enmeshment. None of the *MEPS for Pain* items (assimilative, persistence, accommodative) were correlated with either proximity or enmeshment. Hypothesis 1 was therefore only partially supported by the PaSol assimilative score and was unsupported by the *MEPS for Pain*.

Hypothesis 2 explored proximity to, and enmeshment of the hoped-for self and problem solving. The PaSol assimilative score was significantly correlated with both proximity and enmeshment of the hoped-for self. As participants move further away from their hoped-for self and become more enmeshed assimilative scores increase. However the assimilative, persistence, and accommodative scores as measured by the *MEPS for Pain* were not correlated with either proximity or enmeshment. Hypothesis 2 is therefore supported by the PaSol, but unsupported by the *MEPS for Pain*.

4.2.2 Discussion of the findings

As Wells (2010) did not use the hoped-for self interview, only hypothesis 1 can be discussed in relation to the findings of Wells (2010). Wells (2010), observed

a correlation between proximity to the feared-self and assimilative scores as generated by both the PaSol and the MEPS *for Pain*, however, a regression analysis failed to reach significance when PaSol and MEPS *for Pain* assimilative scores were used as criterion variables. Wells (2010) also observed a correlation between enmeshment of the feared-for self and assimilative scores as generated by both the PaSol and the MEPS *for Pain*. Regression analysis was also significant for the PaSol assimilative score, but not the MEPS *for Pain* assimilative score. The findings of this research, therefore only partially replicate that of Wells (2010).

When exploring the relationship between hoped-self proximity, enmeshment, and problem solving hypothesis 2 is only supported by the PaSol.

The findings observed in this research show differing results depending on the problem solving measure used. These mixed findings, combined with the partial replication of the work of Wells (2010) make the acceptance or rejection of the main hypotheses difficult. The variation in findings may be associated with the instruments used to measure the assimilative and accommodative variables. To measure problem solving, two measures have been used. The PaSol has been used previously with chronic pain patients, with its reliability and validity being established in two previous studies (De Vlieger *et al*, 2006; Crombez *et al*, 2008). However, Crombez *et al* (2008) noted that the PaSol is a self report measure of attitudes towards problem solving making its validity as a measure of actual problem solving problematic. To address this limitation Wells (2010) developed the MEPS *for Pain* based on the control model of self regulation (Powers 1973; Carver and Scheier, 1998) and the dual-process model of problem solving (Bradtstädter and Rothermund, 2002). The MEPS *for Pain*, measures scenario based problem solving attempts and addresses the limitations highlighted by Crombez *et al* (2008). However the MEPS *for Pain* is in the early stages of development.

When exploring the PaSol and MEPS *for Pain* measures further, the data show that the mean and standard deviation for each of the PaSol items in the current study are comparable to those observed by Wells (2010). For the MEPS *for Pain*, the assimilative score was higher and the accommodative score was lower than that observed by Wells (2010). The higher assimilative score may be accounted for by

the changes made to the scoring procedure making the measure more sensitive. However when exploring the individual items the results show that the MEPS *for Pain* assimilative, persistence, and accommodative items performed as expected in relation to each other. Although the correlation between assimilative and accommodative items failed to reach significance, the relationship was in the expected direction. It should also be noted that the inter-rater reliability of the MEPS *for Pain* was very strong, and this was the result of increased training of raters, and addressed the limitations proposed by Wells (2010).

It is clear when comparing the PaSol items with the MEPS *for Pain* items that the two measures were unrelated in this study suggesting that, in this sample, participants' attitudes to problem solving were unrelated to their scenario-based problem solving attempts. This finding, in this sample, therefore supports the hypothesis that how individuals say they approach problem solving is not consistent with their actual problem solving attempts. This is supported within the literature in relation to questionnaire based measures of behaviour. Rust and Golombok (1999) argued that such measures are more subjective than objective in nature, as they strongly rely on participants being able to reflect on their own approaches to behaviour and answer the questionnaire with this in mind.

The dual-process model proposed by Bradtstädter and Rothermund (2002) argues that self regulation occurs when a perceived or expected goal discrepancy occurs due to a change in personal circumstances. Within this research it is proposed that the presence of pain causes this goal discrepancy, blocking the achievement of life goals. The model proposes that when this occurs assimilative or accommodative approaches are used to resolve the discrepancy, removing the blockage and supporting goal achievement. Rothermund (2006) argued that the activation of assimilative or accommodative problem solving approaches are antagonistic in nature, thus when one is activated the other is inhibited. This model has been supported in the literature by Schmitz *et al.* (1996), however, Schmitz *et al.* (1996) observed that flexible adjustment, using a combination of assimilative and accommodative approaches, was associated with reduced distress. The MEPS *for Pain* score did not correlate with the affect score, however, it was observed that

participants used a mixture of assimilative and accommodative problem solving approaches to remove pain or adapt to the blocked goal. This finding therefore replicates that observed by Schmitz *et al.* (1996) and suggests that participants use both assimilative and accommodative problem solving approaches when trying to solve the scenarios presented to them.

4.2.3 Personal problem solving task (MEPS for Pain-PPS) – Hypothesis testing

Hypothesis 1 explored proximity to, and enmeshment of the feared-for self and problem solving as measured by the MEPS for Pain-PPS. None of the MEPS for Pain-PPS items (assimilative, accommodative) were correlated with either proximity to, or enmeshment of the feared-self. Hypothesis 1 is therefore unsupported.

Hypothesis 2 explored proximity to, and enmeshment of the hoped-for self and problem solving as measured by the MEPS for Pain-PPS. Assimilative score, as measured by the MEPS for Pain-PPS was not correlated with hoped-self proximity but was correlated with hoped-self enmeshment. This indicates that as hoped-self enmeshment increases, assimilative score increases. Accommodative score was not correlated with either proximity or enmeshment. Hypothesis 2 is therefore only partially supported by MEPS for Pain-PPS assimilative score, and unsupported by the accommodative score.

4.2.4 Discussion of the findings

Wells (2010) noted that the MEPS for Pain is a scenario based measure of problem solving attempts, acknowledging that while participants are asked to think about how they would solve the problem identified, only some participants applied their own personal approach to the problem scenarios. As a result of this limitation, enmeshed hoped-for self characteristics were used to explore personal problem solving attempts in the current study. Enmeshed hoped-for self characteristics represent principle goals (Powers 1973; Carver and Scheier, 1998) which are blocked by pain (enmeshment). This approach therefore represents a first attempt at measuring personal problem solving, however, is not without its limitations, as discussed later in this chapter. Eccleston and Crombez (2007) argued that

assimilative problem solving is related to greater distress. This is often linked to the concept of misdirected problem solving, where the presence of pain locks the individual into a loop of assimilative problem solving despite feedback that a solution will not be reached. The findings from the personal problem solving task, indicates a relationship between assimilative problem solving and hoped-self enmeshment in this sample. This suggests that, in this sample, as pain and self schemas become more enmeshed, assimilative problem solving approaches increase in an attempt to remove the pain and un-enmesh the overlapping schemas.

It could be argued that enmeshment may be of greater value and accessibility to individuals with chronic pain than proximity. For individuals in chronic pain, a more urgent cognitive and behaviour feedback process may surround a principle goal which is enmeshed by pain, than a principle goal which is un-enmeshed or a principle goal which is further away and un-enmeshed.

4.3 Other Research Findings

4.3.1 Pain disability and pain acceptance

The Pain Disability Index (PDI) measures self reported disability as experienced by participants. The findings in this study show that greater disability was associated with greater pain experienced as measured by Visual Analogue Scale (VAS) pain ratings. This finding replicates those found in the literature (Tait *et al*, 1990; Von Korff *et al*, 1992; Von Korff *et al*, 1993) which observed a relationship between pain intensity and the interference pain has on daily living activities. PDI was also negatively correlated with age, suggesting that as age increases, disability decreases. It could be argued that one explanation of this finding is that older participants were in less pain and therefore less disabled by the pain. An alternative explanation is, however, proposed by Bratstädter, and Renner (1990) who suggested, when using the PDI, that as individuals get older they make adjustments to the circumstances they experience which lessens the impact of pain on disability.

The Chronic Pain Acceptance Questionnaire (CPAQ) is a self reported measure of pain acceptance. The findings in this study show that CPAQ was correlated with age, and negatively correlated with pain intensity, and pain

disability. These findings suggest that as age increases acceptance increases, and as pain intensity and disability increase acceptance decreases. This finding therefore suggests that those participants who experienced greater pain intensity and greater disability were less accepting of their pain and less likely to engage in activities despite the pain. This lends further support to the proposal of Bratstädter, and Renner (1990), while also supporting other findings in the literature. McCracken and Eccleston (2003) for example, observed that pain acceptance predicted pain disability and intensity in a sample of 200 chronic pain patients.

In summary the findings in relation to the VAS pain intensity measures, PDI, and CPAQ have all performed as expected, and as observed in the wider chronic pain literature. These findings are also consistent with the psychological impact of pain as proposed by Morley (2008) as pain, in this sample of participants, is causing interference with daily living.

4.3.2 Affect and chronic pain

The Hospital Anxiety and Depression Scale (HADS) were used in this study to measure affect. The mean depression and anxiety scores for the sample were both in the borderline range (Zigmond and Snaith, 1983). A total distress score was used in the analysis and was calculated by summing the depression and anxiety scores for each participant. PDI was correlated with total distress, whilst age and CPAQ were negatively correlated with total distress. The current study shows that greater disability is related to greater distress. These findings were not observed by Wells (2010), however, are consistent with the wider chronic pain literature. Banks and Kerns (1996), and Romano and Turner, for example, both observed a higher prevalence of distress, as measured by depression, within chronic pain populations when compared to the general population. McCracken and Samuel (2007) observed that greater activity engagement was indicative of better emotional functioning. In this sample pain is interfering with daily activity engagement which is impacting on affect, leading to greater distress. However, it appears that age and acceptance of chronic pain may have a role in reducing the distress experienced by participants in this study.

In summary the HADS as a measure of distress is performing as expected and consistently with previous findings in the literature.

4.3.3 *The feared-for self*

The feared-for self interview was used in this study as a means of replicating the work of Wells (2010). The feared-for self interview, as adapted by Wells (2010), involved participants choosing up to 10 characteristics from a pre-generated set of 25 possible characteristics. The 25 pre-generated characteristics came from previous studies of the feared-for self and therefore were evidence-based (Fogg, 2007; Sutherland and Morley, 2008). The current study shows that this approach was not affected by verbal fluency or educational background and was therefore accessible to all who took part, further supporting the evidence base for the adaptation to the feared-for self interview made by Wells (2010).

Feared-self enmeshment, which measures the extent to which identity and pain are overlapping, did not correlate with any of the pain or affect measures. This is an unexpected finding as previous research has shown that feared-self enmeshment is associated with depression and anxiety (Sutherland, and Morley, 2008).

Feared-self proximity measures the self reported mean distance participants are from their feared-self. Greater scores indicate greater distance from the feared-self. The findings demonstrate that age and acceptance of chronic pain was correlated with proximity. Pain intensity and total distress were negatively correlated with proximity. The current findings therefore suggest that as people get closer to their feared self, acceptance decreases, while pain intensity, disability, and total distress increase. The finding that increased proximity to the feared-self increases distress is supported by Kindermans *et al* (2011). Higgins (1987) argued that an individual's discrepancy between their self and ideal/ought self can impact on mood. What is being observed in the current study is that as participants get closer to that which they fear becoming their distress increases. It could be argued that as proposed by Carver and Scheier (2000), and Mansell (2005), feared-for self characteristics represent anti-goals within a control model of self regulation. Carver

and Scheier (2000) argue that within a control model of self regulation, affect is based on an assessment of velocity towards or away from the anti-goal. In this study increasing pain intensity and disability may therefore be providing feedback to participants that the velocity between present state and reference value is increasing thus causing distress as anti-goals are being moved towards rather than moved away from. This is supported by participants' assessment of expectancy. Expectancy measures the participant's perceived likelihood of the feared-self coming true. Expectancy was correlated with pain intensity and disability, suggesting that the greater pain participants are in and the more this interferes with daily living the greater the likelihood they perceive their feared self will be realized.

When relating this finding to hypothesis 1, what can be observed is that greater proximity to the feared self is associated with greater assimilative problem solving attitudes. This may suggest that as the perceived proximity to the feared-self increases, distress increases, and the ability to move away from this goal is perceived to be blocked by pain. As a result greater emphasis is placed on assimilative problem solving in an attempt to remove the blockage and increase the distance between current state and anti-goal, in an attempt to reduce distress, pain intensity, and disability.

In summary the feared self data follows a pattern consistent to that observed within the literature. However, it was expected that a relationship between feared-self, pain and affect would be observed, which was not.

4.3.3 The hoped-for self

The use of the hoped-for self interview in this study was an extension of the work of Wells (2010). The methodology for the hoped-for self interview was adapted to be consistent with the feared self methodology used by Wells (2010) where 25 pre-generated hoped-self characteristics were used. As with the feared-for self interview these hoped-for self characteristics had been identified in previous research and therefore were evidence-based (Fogg, 2007; Goossens, Kindermans, Morley, Roelofs, Verbunt and Vlaeyen, 2010). The results show that there was no

relationship between verbal fluency, education, and the number of hoped-for characteristics chosen, further supporting the accessibility of this approach.

The results show that hoped-for self enmeshment was correlated with disability and total distress, and was negatively correlated with age, pain duration, and acceptance. This suggests that as pain and hoped-for self become more enmeshed, participants experience greater interference with daily activities, and greater distress. Age, pain duration, and acceptance are associated with less enmeshment. This is consistent with the findings in the literature (Sutherland and Morley, 2008) and is also consistent with the model of schema enmeshment as proposed by Pincus and Morley (2001). The schema enmeshment model proposes that as the ability to achieve one's hoped-for self is perceived to be dependent on pain, continued attempts to remove the pain occur. The findings from the hoped-for self data, combined with the results of hypothesis 2 therefore support this when using the PaSol, but not the MEPS *for Pain*.

Hoped-for self proximity measures the self reported mean distance participants are from their hoped-for self. The findings show that proximity was correlated with disability and total distress, and negatively correlated with acceptance. The findings show that as participants move away from that which they hope to be, disability and distress increase, whilst closeness to the hoped-for self is associated with acceptance of pain. As discussed in relation to the feared-for self in the previous section, these findings are consistent with SDT proposed by Higgins (1987). Unlike the feared-for selves, which are seen as anti-goals, the hoped self represents goals within perceptual control theory. Powers (1973) argued that control is the result of a feedback loop, where behaviour is varied until the reference point (the hoped-for self) is achieved. What is being observed in this study is that the presence of pain is associated with a greater distance between self and hoped self, as conceptualised by SDT (Higgins 1987) or a greater discrepancy between present state and reference value, as conceptualised by PCT (Powers, 1973). This discrepancy results in greater perceived distress and disability. When linking this finding to hypothesis 2, what can be observed is that the greater the discrepancy between self and hoped-for self the greater the tendency participants have towards

assimilative problem solving attitudes as an attempt to bring them closer to the hoped-for self, although this finding is not supported when using the MEPS *for Pain*.

In summary the findings observed when using the hoped-for self interview are consistent with the models of schema-enmeshment (Pincus and Morley, 2008), SDT as proposed by Higgins (1987), and PCT as proposed by Powers (1973). The results suggest that participants who are more enmeshed and further away from their hoped-for self are more distressed and experience greater pain related disability.

4.3.4 Personal problem solving task – The MEPS for Pain-PPS

One of the findings of the personal problem solving task is that the 46 participants identified 118 enmeshed principle goals, however, could not generate any solution for 35 (41.3%) of these. The PaSol has been used within the literature to measure assimilative problem solving approaches in chronic pain (De Vlieger *et al.*, 2006; Crombez *et al.*, 2008). However, the limitations of the PaSol as a questionnaire based measure of problem solving attitudes has been noted by the authors, resulting in Wells (2010) developing the MEPS *for Pain*. The MEPS *for Pain* is a scenario-based measure of actual problem solving attempts. However, as highlighted by Wells (2010), the MEPS *for Pain* does not measure participants' actual problem solving attempts. These limitations resulted in the MEPS *for Pain*-PPS approach being developed in the current study as a measure of personal problem solving.

The results of the current study show that in this sample problem solving attitudes were not related to scenario based problem solving attempts. What was observed is that while all participants were able to generate a solution for each of the four pain related scenarios, four were unable to generate any solution for any of the enmeshed characteristics identified, with the remaining participants having varying levels of success with solution generation. The MEPS *for Pain*-PPS is a new approach and not without limitations, which are discussed later in this chapter. However, the findings of this study suggest that as we get closer to the measurement

of participants' actual problem solving attempts in relation to pain blocked goal; participants experience greater difficulty in solution generation.

Eccleston and Crombez (2007) argue that continued problem solving attempts without a solution has a psychological impact locking the individual into a loop of ineffectual problem solving. What is being observed in the current sample, however, is that for some people it is not that their problem solving is misdirected, but that their problem solving has been abandoned. It is difficult to assess why some individuals struggled to identify a solution to some of their enmeshed hoped-for selves. However, it does appear that for some participants the abandonment of problem solving attempts is occurring for specific enmeshed principle goals. This finding may have clinical implications as it could be hypothesised that patients who are totally enmeshed, and who have abandoned all problem solving attempts in the presence of pain are likely to experience greater psychological distress. This hypothesis was difficult to assess in the current study as participants generally had a mixture of enmeshed and un-enmeshed characteristics, while the MEPS *for pain*-PPS only supported a maximum of three to be explored. It could also be argued that an exploration of this hypothesis would require all enmeshed characteristics to be explored, with an accompanying exploration of the meaning participants placed on each characteristic. Exploring personal meaning would be important, as one un-enmeshed characteristic, which has high personal significance may be sufficient in influencing the psychological distress caused.

4.4 Limitations

The current research has several limitations which may have an impact on the reliability and validity of the results observed. This section will therefore explore each of these limitations and what impact they may have had on the results.

4.4.1 Recruitment

Wells (2010) recruited participants from two NHS pain clinics in Leeds. The current study, recruited from only one of these sites. Although both sites agreed to be involved in the research with ethical and local approval being sought and agreed, access and time issues resulted in this second site being excluded. It is,

however, unclear from the study conducted by Wells (2010) as to how many participants were recruited from each site, making an assessment of the impact of this variation of sites difficult. Although both sites offer similar services, the local population they offer these services to may vary in terms of cultural and economic diversity which may contribute to differing perceptions of pain intensity, disability and psychological distress. This proposition is supported within the literature. Kleinman and Kleinman (1985) argued that pain is constructed by the individual in terms of their relationship with self, family, culture, society and health care professionals. This can impact on cognitions, affect and behaviour influencing the meaning of pain and its impact.

A total of 114 chronic pain patients were approached by either the researcher or the Clinical Nurse Specialist. Of these, 54 chose not to participate in this research representing a refusal rate of 47%. Due to ethical considerations information related to these 54 participants was not collected. The lack of information therefore makes it difficult to assess the extent to which the sample is representative of the wider chronic pain population accessing services. As an attempt to address this limitation the results of the current study have been compared to the findings of Wells (2010) to assess the extent of this possible variation. As much of the data from the two research studies are similar the impact of this limitation on the current results may be minimal, but remains worthy of consideration.

4.4.2 Demographics

An analysis of covariance for the demographic data was not undertaken in this research and should be taken into account when interpreting the findings. One of the demographic variables explored in this research was diagnosis. While all participants experienced chronic pain, the cause of their pain had a great deal of variability as shown in Table 4. Given that each diagnosis generated a small sample size an analysis of covariance would have been problematic. This variability can also be observed in the site of pain and treatments received variables.

The demographic data (age, school leaving age and verbal fluency) in the current research were comparable to those observed by Wells (2010). The mean school leaving age, and mean verbal fluency scores, are similar to findings reported in previous studies (Sutherland, 2004). The mean age however is higher than previous data conducted by Fogg (2007) where a mean age of 50 years was observed, and substantially higher than the mean age of 45 years observed by Sutherland and Morley (2008). As this study replicated the work of Wells (2010) no upper age for participant recruitment was employed. However, given that age negatively correlated with pain intensity, disability, distress, and correlated with acceptance, this may have an impact on the ability to generalise the findings to a younger chronic pain population, a limitation also proposed by Wells (2010). As age may be influencing the meaning of pain as well as how hopes and fears are viewed, this limitation has implications for future research and will be discussed later in this chapter.

4.4.3 Pain measures

The current study used Visual Analogue Scales (VAS) to measure participants' pain intensity at its highest, lowest and usual levels. This method of assessing pain intensity has been established within the literature in previous studies (Von Korff *et al.*, 1992; Von Korff *et al.*, 1993), with Breivik, Björnsson and Skovlund (2000) arguing that VAS are an effective means of measuring pain intensity. However Langley and Sheppard (1985) argue that VAS are prone to flooring and ceiling effects, suggesting that scores should be interpreted with caution. The results in the current study should therefore be interpreted with this potential limitation in mind.

The Pain Disability Index (PDI) was used by Wells (2010) as a measure of pain disability, and has been used in this study to replicate the work of Wells (2010). However, Wells (2010) argued that “the PDI is a subjective measure of pain-related interference and not a behavioural measure of what an individual can actually do” (Wells 2010, p.75). Given this study also observed a negative correlation between PDI and age it is possible, as suggested by Wells (2010), that older participants may

view themselves as less disabled, yet this may be incongruent with the actual disability they experience. It has also been argued by Wells (2010) that the significant negative correlation between age and disability may be a facet of the PDI itself. The PDI assesses pain-related disability in relation to seven life activity areas including; family and home responsibilities and occupation. It has been argued by Wells (2010) that as participants age their responsibilities in relation to other family members as well as occupation responsibilities reduce. Therefore older participants may have lower disability scores as these areas of functioning are less applicable and not experienced as significant life categories where disability may occur. In the current study this limitation may be supported by the large number of participants who were retired (38.3%) and may therefore be experiencing less disability associated with occupational activities, that other participants.

4.4.4 The HADS

The Hospital Anxiety and Depression Scale (HADS) was used in this study to assess anxiety, depression and total distress. The depression score was higher than that observed by Wells (2010), Fogg (2007) and Sutherland (2004). However, the anxiety score was lower than Wells (2010) and Sutherland (2004), and higher than Fogg (2007). Although these findings show a level of variation all of the studies mean depression and anxiety scores were in the non-clinical/borderline range (Zigmond and Snaith, 1983). It has previously been highlighted that levels of depression are high within chronic pain populations (Romano and Turner, 1985; Banks and Kerns, 1996), yet this does not appear to be fully reflected in this study or those previously conducted with similar populations in the same clinic (Well, 2010; Fogg, 2007; Sutherland, 2004). This finding makes it difficult to assess the extent, to which the sample is representative of the wider chronic pain population accessing services. It is possible that those who are experiencing greater levels of anxiety and depression are less likely to participate in research. However, it could also be possible that individuals who are experiencing greater levels of anxiety and depression may be being selected out of the sample on ethical grounds as,

understandably, the focus of care providers in on the individual's well-being rather than their participation in research activity.

4.4.5 The feared-for self interview

The feared-for self interview was adapted by Wells (2010) to support accessibility and reduce participant burden. This approach asks participants to choose 10 feared self characteristics from a pre-selected pack of 25 characteristics. Although participants are informed they can add their own feared self characteristics to the list, the approach used by Wells (2010), and replicated in the current study, appeared to reduce the likelihood of this happening with only two participants generating one additional feared self each in this study. It could also be argued that while it has been observed that participants selected a range of feared self characteristics (range 1-10), the use of this adapted approach may result in participants choosing characteristics as they are directed to select up to 10, rather than because they are personally relevant. This has important implications for the findings observed as characteristics which are seen as less relevant may be less enmeshed, and seen as further away from, influencing both proximity and enmeshment scores.

Wells (2010) noted that as enmeshment is a measurement of the number of characteristics dependent on the presence of pain, divided by the number of un-enmeshed characteristics, for some participants enmeshment may therefore be misrepresented. For example, participants who choose one feared characteristic and identify this characteristic as conditional on the presence of pain would be seen as completely enmeshed, receiving a score of 1. However, a participant who chooses 10 feared characteristics and sees all these characteristics as conditional on the presence of pain would also score 1. This is a limitation highlighted by Wells (2010) and remains in the current study.

The feared-for self interview asks participants to rate, on a seven point likert scale, the expectancy to which feared-self characteristics are likely to come true and the efficacy of preventing these characteristics from coming true. Wells (2010) argued that when completing the feared-for self interview, some participants

found it difficult to assess both expectancy and efficacy and as a result tended to rate these as a 4, which represents the middle of the scale. The observation of Wells (2010) was, however, not observed by the researcher when conducting the interviews in the current study. Despite this, the mean expectancy and efficacy rating observed in this study are similar to those observed by Wells (2010) and therefore this limitation cannot be completely excluded.

4.4.6 The hoped-for self interview

The hoped-for self interview was not used by Wells (2010), however the methodology of asking participants to select 10 hoped self characteristics from a pre-selected pack of 25 was used. While this represents an attempt to increase accessibility and reduce participant fatigue and burden, this methodology carries the same limitations as outlined previously for the feared-for self interview. As these limitations have previously been discussed they will not be repeated here. However, these limitations remain pertinent when considering the hoped-for self interview data.

As with the feared-for self data, the methodology for calculating enmeshment within the hoped-for self interview is open to misrepresentation. As this has been discussed in relation to the feared-for self interview this will not be repeated here.

As the hoped-for self interview was not conducted by Wells (2010) it is difficult to assess whether the limitations associated with participants' ratings of expectancy and efficacy as identified in the feared-for self interview carried over to the hoped-for self interview. From conducting the interviews there did not appear to be a tendency for participants to rate expectancy and efficacy in the middle of the scale. Despite these observations, and as means of 5.12 and 4.49 were observed for expectancy and efficacy the limitation highlighted by Wells (2010) cannot be completely excluded.

4.4.7 The MEPS for Pain

The MEPS *for Pain* is a relatively new measure developed by Wells (2010) to explore scenario-based problem solving attempts. As the development of the

MEPS *for Pain* and its methodology has been discussed extensively previously this information will not be revisited here. Wells (2010) identified a number of limitations associated with the development of the MEPS *for Pain*, which have been addressed in this study as outlined in chapter 2. It was also highlighted by Wells (2010) that the inter-rater reliability of the MEPS *for Pain* was an issue. This limitation has been addressed in chapter 3 through the training of additional raters resulting in a strong ICC being observed.

Although many of the limitations proposed by Wells (2010) have been addressed in this study there remain some difficulties with the measure. The first is associated with the wording of vignette 3 (Chris). Table 19 shows the outline of vignette 3 and the associated vignette structure. Unlike the other 3 stories where Frank, Amanda and Stephen are referred to as having pain(s), Chris is referred to as having a ‘terrible ache’. Observations from administering the MEPS *for Pain* task suggest that the use of ‘terrible ache’ appeared to be seen as less severe than the term ‘pain’ or ‘pains’ and resulted in greater persistence prompts being given by the researcher. This observation is supported within the transcripts where the use of ‘terrible ache’ appears to elicit a greater need to seek diagnosis or suggest that the cause may be simpler and easily fixed. This is highlighted by the response of participant 36 who said “An ache in a leg could be anything it could be so simple...”

The impact of the use of ‘terrible ache’ as oppose to ‘pain’ may result in participants receiving more assimilative and persistence scores, misrepresenting their total problem solving score. This limitation should be addressed by replacing ‘terrible ache’ with ‘pain’.

The second limitation of the MEPS *for Pain* is associated with the assimilative and accommodative scales and their equal weighting. It is proposed within the models underpinning the MEPS *for Pain* that reduced distress and disability is associated with accommodative problem solving approaches (dual-process model, Bradtstädter and Renner, 1990) which allow hierarchical goals to be reorganised through flexible adjustment (PCT, Powers, 1973; Carver and Scheier, 2002). The use of an accommodative problem solving approach therefore has greater weight towards positive well-being than assimilative approaches. Within the

MEPS *for Pain* it is observed that participants generate more assimilative approaches than accommodative, as both are equally weighted however, the higher assimilative score over shadows the accommodative score. If accommodative approaches have a greater influence on psychological well-being it could be argued that this needs to be accounted for in the weighting of each accommodative response given. An individual may, for example, generate fourteen assimilative responses and only one accommodative response; however, this accommodative response may be sufficient to support goal reorganisation, thus having a greater psychological impact. Within the PaSol, assimilative score is generated by summing assimilative items and reverse scoring accommodative items, thus accounting for the contribution accommodative items make. This process is, however, much easier when using a questionnaire with a standardised scale than the open-ended interview approach used by the MEPS *for Pain*. This issue requires further exploration in order for a solution to be reached.

Table 19 Vignette 3 scenario and structure.

Vignette Structure	Pain Scenario
Statement of problem that indicates reference to a blocked program goal due to pain.	Chris could no longer go for his morning run because of a terrible ache in his right leg.
Statement relating blocked program goal to the blocking of a principle goal and the emotional consequence of this	After a few weeks he started to feel as though he was not as fit as he had been. Chris worried about this as he wanted to be a healthy person.
Ending which indicates the problem has been resolved.	The story ends when Chris no longer feels worried.
Instruction for completing the story	You begin the story when Chris first notices his fitness declining.

4.4.8 The MEPS for Pain-PPS

The MEPS *for Pain*-Personal Problem Solving task was developed for this study as a means of addressing limitations of the MEPS *for Pain* highlighted by Wells (2010). Wells (2010, p.79) argued that “although the MEPS measures respondents’ ability to generate different types of solutions to problem vignettes it does not measure the extent to which participants apply this to their own lives”. The MEPS *for Pain*-PPS task therefore represents a first attempt at measuring personal problem solving. The methodology for the MEPS *for Pain*-PPS has been outlined in chapter 2 and shall only briefly be repeated here.

The MEPS *for Pain*-PPS task follows the hoped-for self interview as it uses enmeshed hoped-for self characteristics to act as the target for personal problem solving attempts. The personal problem solving task retains the theoretical underpinnings of the MEPS *for Pain* as enmeshed hoped-for self characteristics represent principle goals within PCT (Powers, 1973; Carver and Scheier, 2002). Once enmeshed hoped-for self characteristics have been identified the participant is asked to select the three that are most important and, once identified, is asked “can you think of a way of achieving this characteristic despite the pain?” Participant responses are then recorded and later analysed using a scoring method adapted from the MEPS *for Pain*.

Although the MEPS *for Pain*-PPS task extends the work of Wells (2010) it is not without its limitations. First, not everyone had enmeshed hoped-for self characteristics resulting in 14 participants being removed from the analysis, reducing the sample size to 46. It should also be noted that hoped-for self enmeshment varied from 1 to 10. Due to ethical considerations of participant fatigue and burnout, a maximum of 3 enmeshed hoped-for self characteristics was set for the MEPS *for Pain*-PPS task. As the range of enmeshed hoped-for self characteristics varied across participants, this meant that a range of 1-3 was observed in the MEPS *for Pain*-PPS task. To address this limitation a weighted mean was used in the analysis, however, this variation may impact on the results as some participants will be contributing more to the analysis than others, while others are excluded completely.

Second, an enmeshed hoped-for self characteristic represents a personal principle goal blocked by pain. However, it is not possible within this task to identify the participant's personal program goal. This means that it is not possible for persistence to be measured and the MEPS *for Pain* item was therefore not used within the MEPS *for Pain*-PPS task scoring procedure. This limitation makes a full comparison between the MEPS *for Pain* items of assimilative, persistence and accommodative problem solving difficult. To address this limitation, the task could be extended, with participants being initially asked how they would normally achieve the identified personal principle goal.

Thirdly, although participants were directed to choose the enmeshed hoped-for self characteristics important to them, it was unclear whether this occurred. It has been observed in the results of this study that problem solving was abandoned for 41.3% of identified enmeshed characteristics. One explanation is that the longer characteristics are enmeshed the greater the likelihood that problem solving abandonment will occur. However, it could also be argued that less personally important characteristics are more open to abandonment as problem solving attention and effort is directed towards more meaningful goals, an alternative principle goal or goals un-enmeshed by pain. As the length of enmeshment and the personal meaning of goals were not measured these findings remain difficult to assess.

Finally, and related to the limitation above, the personal meaning of all characteristics chosen, whether enmeshed or not, was not assessed in this study. It could be argued that a small number of un-enmeshed characteristics which have high personal significance may act as a protective factor against enmeshed principle goals. To address this limitation an adaptation to the hoped-for self interview is proposed. When asking participants to identify up to 10 hoped-for self characteristics, the participant should also be asked to rank these characteristics in order of importance. This should be done prior to being asked about proximity and enmeshment, and prior to completing the MEPS *for Pain*-PPS task. This adaptation will allow the meaning placed on each identified characteristic to be analysed further.

4.4.9 Study design and normal distribution

This study used a single group, observational design. This design was used by Wells (2010) and follows the same design used by previous researchers in the chronic pain field (Fogg, 2007; Sutherland, 2004). Although this design has been used previously, it only allows the relationship between variables to be explored, rather than causality.

As much of the data was significantly non-normally distributed, the use of parametric statistical analysis was not always possible. For variables that showed non-normal distribution Kendall's Tau (τ) was used. Tomkins (2006), when reviewing the use of parametric and non-parametric tests in health science research, showed that parametric tests were only more powerful than non-parametric tests when all assumptions were met, and were just as powerful as non-parametric tests when used with small sample sizes. Despite this finding, Tomkins (2006) argued that it remains a common misconception that parametric tests have more power than their non-parametric counterparts, and suggests that choosing a statistical test which matches the data should be the researcher's main focus.

4.5 Clinical Implications

The results of this study may have clinical implications for people experiencing chronic pain. It has been established within the literature that pain has a psychological consequence, causing interference and impacting on the patient's sense of self (Morley, 2008). Research has shown that persistent attempts at solving an unsolvable problem results in disability and distress (Eccleston and Crombez, 2007). The current study has drawn on theories of flexible control (Powers, 1973), self discrepancy (Higgins, 1987) and enmeshment (Pincus and Morley, 2001) in an attempt to understand the relationship between pain and problem solving. The findings of this study show that participants are able to use a mixture of assimilative and accommodative problem solving approaches when faced with goals blocked by pain. The results also suggest that proximity to, and enmeshment of, feared and hoped-for goals may be linked to the types of problem solving approaches used. A review of the literature and the findings of this study suggest that clinical approaches which support chronic pain patients to take a flexible approach to blocked goals may

be beneficial in reducing both distress and disability. Two therapeutic approaches may therefore have clinical implications in light of the literature and findings of this study. The first is Method of Levels (Carey, 2006) and the second is Acceptance and Commitment Therapy (Hayes, Strosahl and Wilson, 1999).

4.5.1 Method of levels

Method of Levels (MOL) is an approach based on perceptual control theory (Powers, 1973), and assumes that psychological distress occurs when “people are unable to control what is important to them” (Carey and Mullan, 2008, p.247). It has been highlighted in this study with reference to the work of Powers (1973) and Carver and Scheier (2002) that control within a living system is the result of feedback loops which compare present state with a reference value. These feedback loops sit within a hierarchical system and influence each other. It is proposed within the literature that when the achievement of a higher goal is blocked, as is the case in chronic pain, patients either persist or reorganize goals in an attempt to overcome the blockage. Powers (2010) argued that when conflict exists between systems and reorganization is not possible control within these systems will fail due to the absence of an alternative.

MOL involves two processes, the first is to support patients to shift their awareness towards higher systems in conflict, while the second is to support the patient to explore the conflict and enable change through reorganisation of goals (Powers, 2010). Awareness is therefore a significant process in the reorganisation of goals within the MOL approach. Carey (2006, p.63) argued that “in order to be useful to clients, the only task is to provide opportunities for them to redirect their awareness to higher levels where reorganization can eliminate the conflict they experience”.

Carey (2006) argued that the therapist role within MOL is to be aware of clients’ thought processes, and identified patients foreground and background thoughts as significant. Foreground thoughts within MOL are seen as representing one level of the hierarchy, background thoughts or “meta-comment” represent a higher level (Carey (2006, p.65). Carey (2006) argued that disruptions in the

patients' discourse offers the therapist a cue towards background thoughts and suggests that when this occurs the therapist role is to comment on this shift in awareness, refocusing the patient's awareness on these meta comments. Powers (2010) argued that the therapist should continue to shift the patient's focus to higher perceptual levels until the conflict is reached. Once this conflict is reached, the aim is to define the conflict, and explore both sides of the conflict which, Powers (2010) argued, results in goal reorganisation.

Despite the theoretical links between PCT and MOL, a review of the literature revealed that few studies have explored its use in clinical populations. It should also be noted that a review of the literature did not reveal any studies which used MOL within chronic pain populations. Carey and Mullen (2008) did, however, observe MOL to be an effective approach in a sample of 101 patients accessing primary care with common mental health problems such as anxiety and depression. Given the links between MOL and PCT as explored in this study, it could be argued that this approach may be of use to patients experiencing chronic pain. More research is however required, specifically around the use of MOL in chronic pain populations.

4.5.2 Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (ACT) has received growing research and clinical attention (Veehof, Oskam, Schreurs and Bohleijer, 2011). Hayes, Strosahl and Wilson (1999) argue that the main aim of ACT is to increase psychological flexibility. Psychological flexibility is defined as "the ability to contact the present moment more fully as a conscious human being, and either change or persist when doing so serves valued ends" (Hayes, Strosahl, Bunting, Twohig and Wilson, 2004, p.5). This definition is in keeping with what is being explored in this study in relation to both assimilative and accommodative problem solving, and valued goals as defined by the hoped-for self. Hayes *et al.* (1999) emphasise the notion of value-based living, where patients are encouraged to focus on present experiences, reduce avoidance of unwanted experiences, and move

attention and behaviour towards goals of personal value. Values within ACT are defined as “chosen qualities of purposive action” (Hayes *et al.* 2004, p.10)

There are a number of techniques associated with ACT including: committed action, cognitive defusion and creative hopelessness. Committed action involves defining goals and acting on these goals while anticipating and negotiating psychological barriers. This could be applied to the current research in terms of achieving hoped-for self characteristics alongside pain. Cognitive defusion involves creating a distance between self and thoughts, while creative hopelessness promotes the unhelpfulness of control and avoidance. Creative hopelessness is an approach which could be compared to assimilative and accommodative problem solving as defined by the dual-process model (Bradtstädter and Renner, 1990). Within ACT, persistent problem solving attempts would be reviewed in terms of their helpfulness with the aim of supporting a transition to a position of psychological flexibility, where alternative options (accommodative problem solving) may be explored.

Dahl, Wilson and Nilsson (2004) highlighted the role of the life compass technique. This technique first asks patients to identify valued goals, then explores whether the coping strategies patients employ “keeps them on course or takes them off course” Dahl *et al.* (2004, p.790). Patients are also asked to identify the barriers which prevented them from moving towards their values, and where barriers are perceived, explore possible alternative routes to value fulfilment. This process allows patients to acknowledge barriers and negotiate around them. It could be argued that the life compass technique as proposed by Dahl *et al.* (2004) has strong links with feared/hoped self enmeshment. The clinical use of the life compass technique may therefore be effective in supporting chronic pain patients to explore alternatives when values are enmeshed by pain.

The use of ACT with patients experiencing chronic pain has received support within the literature. McCracken and Vowles (2008), observed that the acceptance of pain and value-based action, was significantly correlated with pain related distress, avoidance, interference and functioning in a sample of 115 chronic pain patients. The authors argued that this finding suggests that the processes underlying both acceptance and value-based action are significant for those in

chronic pain and helpful to their psychological well-being. Veehof *et al.* (2011) compared Acceptance and Commitment Therapy to Cognitive Behavioural Therapy using a meta-analysis approach. The authors observed medium effect sizes for psychological wellbeing, quality of life, depression, anxiety and pain intensity suggesting that chronic pain patients respond to Acceptance and Commitment Therapy. Similar effect sizes were, however, also observed with Cognitive Behavioural Therapy, leading the authors to argue that ACT is as effective as CBT in the treatment of chronic pain patients.

4.5.3 Recommendations for pain management services

Both ACT and MOL have been identified as therapeutic approaches that might support people experiencing chronic pain to achieve a level of psychological flexibility; however, these approaches are not always readily available to health care professionals working in pain management services. As this research suggests that helping people adjust their personal goals or find alternatives has a significant positive impact on the distress and disability they experience, it is important to identify a number of recommendations for those working in pain management services.

It has been established that engagement in activity reduces psychological distress and perceived disability; while this is not a new finding, it does remain a significant one, and it is therefore important to revisit this as a recommendation. Being active was the most frequently chosen hoped-for self chosen by participants in this study; however, one of the difficulties associated with this goal is that chronic pain is likely to cause interference with achieving this. Therefore, it is recommended that pain management services continue to promote activity engagement as a way of supporting people in chronic pain to maintain positive psychological wellbeing. However, given that pain is likely to interfere with this goal, it is important that time should be spent with patients recalibrating this goal to account for the pain they experience. On a practical level, this would mean spending clinical time with a patient exploring alternative ways of being active in the presence of pain. It is likely that such an approach may support patients in shifting their focus

away from what they are unable to achieve and towards what they are able to do and, therefore, improve their hope for the future, whilst simultaneously reducing distress and perceived disability.

It has been shown in this research that focusing an individual's attention towards goals which are in conflict can lead to their reorganisation. The hoped-for self interview has been used as a research tool within this study; however, it may also be useful as a clinical tool. By using the hoped-for self interview, clinicians can support the patient in exploring which goals are important, identify those which are dependent on the presence of pain and evaluate an individual's proximity to these. This process may support people with chronic pain to focus their attention towards goals that are not dependent upon pain and to identify ways that they can improve their functioning in that area. The use of the hoped-for self interview would also identify enmeshed goals; those which are blocked by pain. This process focuses an individual's attention towards these goals and could be used to facilitate a collaborative discussion between professional and patient, exploring the alternative routes by which their hoped-for goals could be achieved. Therefore, it is recommended that the hoped-for self interview is used in pain management services as a structured tool to help both patients and professionals engage in a flexible goal attainment process.

4.6 Future Research

The findings of the current study suggest a number of areas where further research would be important.

It has been observed in this study that age has a significant negative relationship with distress, acceptance of chronic pain, and perceived disability. The role of age in buffering the effects of chronic pain is therefore worthy of further investigation. The cognitive processes underlying why older chronic pain patients are less distressed compared with younger chronic pain patients may go some way to explaining why some patients experience greater distress as a consequence of their pain than others. As the current study had no upper age limit, and the sample was older than observed in previous studies this analysis was not possible in this study. Future research may benefit from looking to replicate aspects of the current study, recruiting from both older and younger chronic pain populations to facilitate a comparison group analysis. It may be hypothesised that younger chronic pain patients have more enmeshed hoped/feared characteristics, are closer to their feared self and further from their hoped self and are more assimilative in their problem solving attempts due the value being placed on achievement of hoped-for goals and avoidance of feared-for goals. This may be linked to theories of life trajectory, where chronic pain acts as a significant interference in how people can construct their hopes and wants for their future.

The second area of future research is related to the *MEPS for Pain*. The results of the current study did not replicate those observed by Wells (2010), although limitations associated with reliability have been addressed resulting in greater inter-rater reliability. The results of the current study raise issues of the validity of the *MEPS for Pain*. One of the difficulties associated with the *MEPS for Pain* is its lack of a comparative measure. The *PaSol* has been used in this study and by Wells (2010) for comparison yet the limitations of the *PaSol* as a measure of actual problem solving attempts have been clearly outlined. As the *MEPS for Pain* is a relatively new measure further research is required to explore its validity.

The third possible area of future research is in relation to the *MEPS for Pain-PPS*. This measure of personal problem solving attempts was developed for

this study and observed that for some patients in the current study personal problem solving attempts are abandoned in relation to some enmeshed goals. As the MEPS *for Pain*-PPS is a new measure limitations associated with its construction as discussed earlier would need to be addressed. Future research would need to adapt the measure to allow for the meaning of both enmeshed and un-enmeshed hoped self characteristics to be assessed. This could be addressed by asking participants to rank the importance of characteristics when chosen. To improve the MEPS *for Pain*-PPS it may also be helpful to ensure that both principle and program goals are identified. This could be addressed by asking participants how they would normally achieve an enmeshed hoped-for self characteristic in the absence of pain, following which the achievement of the characteristic despite the pain could be explored. Such an approach may better support our understanding of whether problem solving abandonment is a facet of the current study or an observable phenomenon within chronic pain populations.

Finally, the current study highlights the use of MOL as possible treatment approach in the management of chronic pain. It has, however, been noted that there is a lack of research evidence around its effectiveness in this population. Given the links the current study make between PCT and the enmeshment of feared/hoped characteristics, the use of MOL is worthy of further exploration in terms of its possible role in the un-enmeshment process. To test this hypothesis an initial approach may be to use a multiple single case study design.

REFERENCES

- Banks, S. M., & Kerns, R. D. (1996). Explaining high rates of depression in chronic pain: A diathesis-stress framework. *Psychological Bulletin*, 119(1), 95-110.
- Benton, A. L., & Hamsher, K. D. (1976). *Multilingual Aphasia Examination: Manual of instruction*. Iowa City: University of Iowa.
- Brandtstadter, J., & Renner, G. (1990). Tenacious Goal Pursuit and Flexible Goal Adjustment: Explication and Age-Related Analysis of Assimilative and Accommodative Strategies of Coping. *Psychology & Aging*, 5(1), 58-67.
- Brandtstadter, J. & Rothermund, K. (2002). The Life-Course Dynamics of Goal Pursuit and Goal Adjustment: A Two-Process Framework. *Developmental Review*, 22(1), 117-150.
- Breivik, E. K., Björnsson, G. A., & Skovlund, E. (2000). A Comparison of Pain Rating Scales by Sampling From Clinical Trial Data. *The Clinical Journal of Pain*, 16(1), 22-28.
- Brown, G. K., & Nicassio, P. M. (1987). Development of a questionnaire for the assessment of active and passive coping strategies in chronic pain patients. *Pain*, 31(1), 53-64.
- Carey, T. A. (2006). *The method of levels: How to do psychotherapy without getting in the way*. Hayward: Living Control System Publishing.
- Carey, T. A., & Mullan, R. J. (2008). Evaluating the method of levels. *Counselling Psychology Quarterly*, 21(3), 247-256.
- Carver, C. S., & Scheier, M. F. (1982). Control Theory: A Useful Conceptual Framework for Personality-Social, Clinical, and Health Psychology. *Psychological Bulletin*, 92(1), 111-135.
- Carver, C. S., & Scheier, M. F. (1999). Control Theory: A useful conceptual framework for personality-social, clinical, and health psychology. In R. F. Baumeister (Ed.), *The self in social psychology*. Philadelphia: Psychological Press.
- Carver, C. S., & Scheier, M. F. (2000). Scaling back goals and recalibration of the affect system are processes in normal adaptive self-regulation: understanding 'response shift' phenomena. *Social Science and Medicine*, 50, 1715-1722.

- Carver, C. S., & Scheier, M. F. (2002). Control processes and self-organisation as complementary principles underlying behaviour. *Personality and Social Psychology Review*, 6(4), 304-315.
- Cook, A. J., Brawer, P. A., & Vowles, K. E. (2006). The fear-avoidance model of chronic pain: Validation and age analysis using structural equation modelling. *Pain*, 121(3), 195-206.
- Crombez, G., Eccleston, C., Baeyens, F., & Eelen, P. (1998). When somatic information threatens, catastrophic thinking enhances attentional interference. *Pain*, 75, 187-198.
- Crombez, G., Eccleston, C., VanHamme, G., & DeVlieger, P. (2008). Attempting to solve the problem of pain: A questionnaire study in acute and chronic pain patients. *Pain*, 137(3), 556-563.
- Cuijpers, P., Van Straten, A., & Warmerdam, L. (2007). Behavioral activation treatments of depression: A meta-analysis. *Clinical Psychology Review*, 27(3), 318-326.
- Dahl, J., Wilson, K. G., & Nilsson, A. (2004). Acceptance and Commitment Therapy and the Treatment of Persons at Risk for Long-Term Disability Resulting From Stress and Pain Symptoms: A Preliminary Randomized Trial. *Behavior Therapy*, 35, 785-801.
- De Vlieger, P., Bussche, E. V. d., Eccleston, C., & Crombez, G. (2006). Finding a solution to the problem of pain: Conceptual formulation and the development of the Pain Solutions Questionnaire (PaSol). *Pain*, 123(3), 285-293.
- Dysvik, E., Natvig, G., Eikeland, O., & Lindstrom, T. (2005). Coping with chronic pain. *International Journal of Nursing Studies*, 42(3), 297-305.
- D'zurilla, T. J., & Goldfried, M. R. (1971). Problem solving and behavior modification. *Journal of Abnormal Psychology*, 78(1), 107-126.
- D'Zurilla, T. J., Nezu, A. M., & Maydeu-Olivares, A. (2004). Social problem solving: Theory and assessment. In E. C. Chang, T. D'Zurilla & L. Sanna (Eds.), *Social problem solving: Theory, research, and training* (pp. 11-27). Washington, DC: American Psychological Association.
- Eccleston, C., & Crombez, G. (1999). Pain demands attention: A cognitive-affective model of the interruptive function of pain. *Psychological Bulletin*, 125(3), 356-366.
- Eccleston, C., & Crombez, G. (2007). Worry and chronic pain: A misdirected problem solving model. *Pain*, 132(3), 233-236.

- Faucett, J. A. (1994). Depression in Painful Chronic disorders: The Role of Pain and Conflict About Pain. *Journal of Pain and Symptom Management*, 9(8), 520-526.
- Fogg, A. R. (2007). *Being, doing and accepting : goals and identity in the process of enmeshment in chronic pain*. D. Clin. Psychol, University of Leeds, Leeds.
- Forssell, D. (1994). *PCT in a nutshell*. [on-line] http://www.perceptualcontroltheory.org/articles/Intros/1994_Forssell_PCTInANutshell.html. Accessed 27th June 2011.
- Goossens, M. E., Kindermans, H. P., Morley, S. J., Roelofs, J., Verbunt, J., & Vlaeyen, J. W. (2010). Self-discrepancies in work-related upper extremity pain: Relation to emotions and flexible-goal adjustment. *European Journal of Pain*, 14(7), 764-770.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: an experiential approach to behavior change*. New York: The Guilford Press.
- Hayes SC, Strosahl KD, Bunting K, Twohig M, & Wilson KG (2004). What is Acceptance and Commitment Therapy. In SC Hayes & KD Strosahl (Eds.). *A practical guide to Acceptance and Commitment Therapy*. New York: Springer.
- Higgins, E. T. (1987). Self-Discrepancy: A Theory Relating Self and Affect. *Psychological Review*, 94(3), 319-340.
- Heyl, V., Wahl, H.-W., & Mollenkopf, H. (2007). Affective Well-Being in Old Age. *European Psychologist*, 12(2), 119-129.
- Hooker, K., & Kaus, C. R. (1994). Health-Related Possible Selves in Young and Middle Adulthood. *Psychology & Aging*, 9(1), 126-133.
- International Association for the Study of Pain. (1986). Pain terms a current list with definitions and notes on usage. *Pain*, 24 (Supplement 1), S215-S221.
- Kindermans, H. P. J., Huijnen, I. P. J., Goossens, M. E. J. B., Roelofs, J., Verbunt, J. A., & Vlaeyen, J. W. S. (2011). "Being" in pain: The role of self-discrepancies in the emotional experience and activity patterns of patients with chronic low back pain. *Pain*, 152(2), 403-409.
- Kleinman, A., & Kleinman, J. (1985). Somatization: The interconnections in Chinese society among culture, depressive experiences, and the meanings of pain. In A. Kleinman & B. Good (Eds.), *Culture and depression: studies in*

the anthropology and cross-cultural psychiatry of affect and disorder. Los Angeles, California: University of California Press.

- Langley, G. B., & Sheppard, H. (1985). The visual analogue scale: Its use in pain measurement. *Rheumatology International*, 5(4), 145-148.
- Lethem, J., Slade, P. D., Troup, J. D. G., and Bentley, G. (1983). Outline of a fear-avoidance model of exaggerated pain perception. *Behavioural Research and Therapy*, 21, 401-408.
- Linton, S. J., Vlaeyen, J., & Ostelo, R. (2002). The Back Pain Beliefs of Health Care Providers: Are We Fear-Avoidant? *Journal of Occupational Rehabilitation*, 12(4), 223-232.
- May, B. (1991) Pain. In Pitts, M., and Philips, K. (Eds). *The Psychology of Health: an introduction*. London: Routledge.
- McCracken, L. M., & Eccleston, C. (2003). Coping or acceptance: what to do about chronic pain? *Pain*, 105, 197-204.
- McCracken, L. M., & Samuel, V. M. (2007). The role of avoidance, pacing, and other activity patterns in chronic pain. *Pain*, 130(1-2), 119-125.
- McCracken, L. M., & Vowles, K. E. (2008). A prospective analysis of acceptance of pain and values-based action in patients with chronic pain. *Health Psychology*, 27(2), 215-220.
- McCracken, L. M., Vowles, K. E., & Eccleston, C. (2004). Acceptance of chronic pain: component analysis and a revised assessment method. *Pain*, 107, 159-166.
- McGraw, K. O., & Wong, S. P. (1996). Forming Inferences About Some Intraclass Correlation Coefficients. *Psychological Methods*, 1(1), 30-46.
- McWilliams, L. A., Cox, B. J., & Enns, M. W. (2003). Mood and anxiety disorders associated with chronic pain: an examination in a nationally representative sample. *Pain*, 106(1), 127-133.
- Mansell, W. (2005). Control theory and psychopathology: an integrative approach. *Psychology and Psychotherapy: Theory, Research and Practice*, 78, 141-178.
- Morley, S. (2008). Psychology of pain. *British Journal of Anaesthesia*, 101(1), 25-31.

- Morley, S., Davies, C., & Barton, S. (2005). Possible selves in chronic pain: self-pain enmeshment, adjustment and acceptance. *Pain*, 115(1-2), 84-94.
- Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist*, 41, 954-969.
- Nicholas, M., K., & Asghari, A. (2006). Investigating acceptance in adjustment to chronic pain: Is acceptance broader than we thought? *Pain*, 124(3), 269-279.
- Pincus, T., & Morley, S. (2001). Cognitive-processing bias in chronic pain: A review and integration. *Psychological Bulletin*, 125(5), 599-617.
- Platt, J. J., & Spivack, G. (1975). Unidimensionality of the means-ends problem-solving (MEPS) procedure. *Journal of Clinical Psychology*, 31(1), 15-16.
- Pollard, A. C. (1984). Preliminary validity study of the Pain Disability Index. *Perceptual and Motor Skills*, 59, 974.
- Powers, M. (1973). *Behavior: The Control of Perception* New York: Hawthorne.
- Powers, W. T. (1995). *The nature of PCT*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.
- Powers, W. T. (2010). The Method of Levels: a cognitive-therapy synthesis. [online]. Retrieved from <http://www.pctweb.org/PCTMOL2.pdf> Accessed 06 June 2012.
- Richardson, E. J., Ness, T. J., Doleys, D. M., Baños, J. H., Cianfrini, L., & Richards, J. S. (2010). Catastrophizing, Acceptance, and Interference: Laboratory Findings, Subjective Report, and Pain Willingness as a Moderator. *Health Psychology*, 29(3), 299-306.
- Romano, J. M., & Turner, J. A. (1985). Chronic Pain and Depression: Does the Evidence Support a Relationship? *Psychological Bulletin*, 97(1), 18-34.
- Rothermund, K. (2006). Hanging On and Letting Go in the Pursuit of Health Goals: Psychological Mechanisms to Cope with a Regulatory Dilemma. In D. T. D. de Ridder & J. B. F. de Wit (Eds.), *Self-regulation in Health Behavior*. New York: John Wiley & Sons Ltd.
- Ruff, R. M., Light, R. H., Parker, S. B., & Levin, H. S. (1996). Benton controlled oral word association test: Reliability and updated norms. *Archives of Clinical Neuropsychology*, 11(4), 329-338.
- Rust, J., & Golombok, S. (1999). *Modern psychometrics: the science of psychological assessment*. London: Routledge.

- Schmitz, U., Saile, H., & Nilges, P. (1996). Coping with chronic pain: flexible goal adjustment as a buffer against pain-related distress. *Pain*, 67, 41-51.
- Sutherland, R. (2004). *Self-discrepancies, sociotropy and autonomy in chronic pain*. D. Clin. Psychol, University of Leeds, Leeds.
- Sutherland, R., & Morley, S. (2008). Self-pain enmeshment: Future possible selves, sociotropy, autonomy and adjustment to chronic pain. *Pain*, 137(2), 366-377.
- Tabachnik, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education.
- Tait, R. C., Chibnall, J. T., & Krause, S. (1990). The Pain Disability Index: psychometric properties. *Pain*, 40(2), 171-182.
- Tomkins, C. C. (2006). An Introduction to Non-parametric Statistics for Health Scientists. *University of Alberta Health Sciences Journal*, 3(1), 20-26.
- Veehof, M. M., Oskam, M.-J., Schreurs, K. M. G., & Bohlmeijer, E. T. (2011). Acceptance-based interventions for the treatment of chronic pain: A systematic review and meta-analysis. *Pain*, 152(3), 533-542.
- Turner, J. A., Jensen, M. P., & Romano, J. M. (2000). Do beliefs, coping, and catastrophizing independently predict functioning in patients with chronic pain? *Pain*, 85(1-2), 115-125.
- Verhaak, P. F. M., Kerssens, J. J., Dekker, J., Sorbi, M. J., & Bensing, J. M. (1998). Prevalence of chronic benign pain disorder among adults: a review of the literature. *Pain*, 77, 231-239.
- Vlaeyen, J., Kole-Snijders, A. M. J., Boeren, R. G. B., & van Eek, H. (1995). Fear of movement/(re) injury in chronic low back pain and its relation to behavioral performance. *Pain*, 62, 363-372.
- Von Korff, M., Deyo, R. A., Cherkin, D., & Barlow, W. (1993). Back Pain in Primary Care: Outcomes at 1 Year. *Spine*, 18(7), 855-862.
- Von Korff, M., Ormel, J., Keefe, F. J., & Dworkin, S. F. (1992). Grading the severity of chronic pain. *Pain*, 50, 133-149.
- Vowles, K. E., McCracken, L. M., & Eccleston, C. (2008). Patient functioning and catastrophizing in chronic pain: The mediating effects of acceptance. *Health Psychology*, 27(2, Suppl), S136-S143.

- Wells, C. (2010). *Persistence with non-functional problem solving in chronic pain*. D.Clin.Psychol., University of Leeds: Leeds.
- Wrosch, C., Scheier, M. F., Carver, C. S., & Schulz, R. (2003). Importance of goal disengagement in adaptive self regulation: When giving up is beneficial. *Self and Identity*, 2, 1-20.
- Wrosch, C., Scheier, M. F., Miller, G. E., Schulz, R., & Carver, C. S. (2003). Adaptive Self-Regulation of Unattainable Goals: Goal Disengagement, Goal Reengagement, and Subjective Well-Being. *Personality and Social Psychology Bulletin*, 29(12), 1494-1508.
- Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67(6), 361-370.

APPENDICES

Appendix 1 – Letter of Ethical Approval

**National Research Ethics Service****NRES Committee Yorkshire & The Humber - Leeds Central**

Yorkshire and Humber REC Office
First Floor, Millside
Mill Pond Lane
Meanwood
Leeds
LS6 4RA

Telephone: 0113 3050127

01 July 2011

Mr Stephen F Donaldson
Psychologist in Clinical Training
The Leeds Teaching Hospitals NHS Trust
Leeds Institute of Health Sciences
Charles Thackrah Building, 101 Clarendon Road
Leeds
LS2 9JL

Dear Mr Donaldson

Study title: Persistence in problem solving in chronic pain
REC reference: 11/YH/0209

The Research Ethics Committee reviewed the above application at the meeting held on 17 June 2011. Thank you for attending to discuss the study.

Ethical opinion

The Committee suggested to you that 108 interviews seemed like a large amount of information to transcribe. You explained that you are hoping for between 60 and 80 participants, as previous studies have shown that this is a manageable number. You informed members that experience has shown that often these interviews can be very short.

Members asked you if participants would be offered a break during the interview. You confirmed that the participants will be able to take breaks during the interview.

The Committee suggested to you that the problem-solving task could sound intimidating to some participants and that perhaps emphasis should be on the approach to problem solving. You explained that the PIS had been used before and that participants had not commented on the wording of the task, but that this could be changed at the Committee's request.

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites**NHS Sites**

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of

the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

1. The participant information sheet should include information regarding your obligation to break confidentiality should the participant disclose safeguarding issues or criminal activity.

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. Confirmation should also be provided to host organisations together with relevant documentation

Approved documents

The documents reviewed and approved at the meeting were:

<i>Document</i>	<i>Version</i>	<i>Date</i>
Covering Letter		23 May 2011
Evidence of insurance or indemnity		29 September 2010
Investigator CV		16 May 2011
Other: CV - Stephen Morley (Supervisor)		16 May 2011
Participant Consent Form	1.0	06 February 2011
Participant Information Sheet	1.0	06 February 2011
Protocol	1.0	06 February 2011
REC application	1.0	23 May 2011
Referees or other scientific critique report		15 November 2010

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

11/YH/0209

Please quote this number on all correspondence

With the Committee's best wishes for the success of this project

Yours sincerely



Dr Margaret L Faulk
Chair

Email: nicola.mallender-ward@nhs.net

Enclosures: List of names and professions of members who were present at the meeting and those who submitted written comments

"After ethical review – guidance for researchers"

Copy to: Mrs Rachel De Souza, University of Leeds
Ms Anne Gowing, Leeds teaching Hospitals NHS Trust



National Research Ethics Service

NRES Committee Yorkshire & The Humber - Leeds Central

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07 July 2011

Mr Stephen F Donaldson
Psychologist in Clinical Training
The Leeds Teaching Hospitals NHS Trust
Leeds Institute of Health Sciences
Charles Thackrah Building, 101 Clarendon Road
Leeds
LS2 9JL

Dear Mr Donaldson

Full title of study: Persistence in problem solving in chronic pain
REC reference number: 11/YH/0209

Thank you for your letter of 05 July 2011. I can confirm the REC has received the documents listed below as evidence of compliance with the approval conditions detailed in our letter dated 17 June 2011. Please note these documents are for information only and have not been reviewed by the committee.

Documents received

The documents received were as follows:

Document	Version	Date
Participant Information Sheet	2	04 July 2011

You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor's responsibility to ensure that the documentation is made available to R&D offices at all participating sites.

11/YH/0209

Please quote this number on all correspondence

Yours sincerely

Mrs Nicola Mallender-Ward
Committee Co-ordinator

E-mail: nicola.mallender-ward@nhs.net

Appendix 2 – Pain Rating Visual Analogue Scales (VAS)

1) Indicate along the scale below the intensity of the painful sensation at its highest intensity.



2) Indicate along the scale below the intensity of the painful sensation at its lowest intensity



3) Indicate along the scale below the intensity of the painful sensation at its usual intensity



Appendix 3 - The possible solutions to pain questionnaire (PaSol)

People who have pain develop different ways to respond to that pain. We would like to know how you deal with the problem of pain. Please read each statement and indicate the extent to which the following thoughts or activities apply for you now. Please mark your response by circling the number to the right of each statement from 0 (not at all applicable) to 6 (highly applicable)

	0 Not at all applicable	1	2	3	4	5	6 Highly applicable
1. Even when I have severe pain, I still find my life meaningful.	0	1	2	3	4	5	6
2. Even when I have severe pain, I can see a way out.	0	1	2	3	4	5	6
3. I try to live with my pain.	0	1	2	3	4	5	6
4. I can live with the idea that there is no solution for my pain.	0	1	2	3	4	5	6
5. I can accept that I can't control my pain.	0	1	2	3	4	5	6
6. I have confidence that they will find a solution for my pain.	0	1	2	3	4	5	6
7. I keep searching for ways to control my pain.	0	1	2	3	4	5	6
8. I try to make the best of my life, despite the pain.	0	1	2	3	4	5	6
9. I can accept that there is no solution for my pain.	0	1	2	3	4	5	6
10. I try everything to get rid of my pain.	0	1	2	3	4	5	6
11. I keep searching for a solution for my pain.	0	1	2	3	4	5	6
12. I would do anything to be without pain.	0	1	2	3	4	5	6
13. I don't let the pain get in my way.	0	1	2	3	4	5	6
14. I am convinced that there is a treatment for my pain.	0	1	2	3	4	5	6

Appendix 4 - The means-end problem solving for pain task (*MEPS for Pain*)

Participant Instructions: I am going to read you a series of short stories. In each case the person in the story is faced with a problem or dilemma. I am going to read you the beginning of the story, where the person in the story has a problem, and the end of the story, where the problem has been solved. I would like you to fill in the middle of the story by explaining how the person got from the beginning to the end. To help you think about how the person has reached the end of the story consider how you might act if you were in a similar situation.

Story 1 – Frank

Frank couldn't play tennis anymore because of his back pain. Frank felt that his friends at the tennis club might be avoiding him. This upset Frank as it was important for him to be a sociable and well-liked person.

The story ends when Frank no longer feels upset.

You begin the story when Frank first notices his tennis club mates avoiding him

Story 2 –Amanda

Amanda was having difficulties concentrating at work because of pain in her right hand and wrist.

Amanda felt that she was no longer achieving her targets at work. Amanda felt down about this as it was important for her to be successful at work.

The story ends when Amanda no longer feels down.

You begin the story when Amanda begins to feel that she is no longer achieving her targets at work.

Story 3 – Chris

Chris could no longer go for his morning run because of a terrible ache in his right leg.

After a few weeks he started to feel as though he was not as fit as he had been.

Chris worried about this as he wanted to be a healthy person.

The story ends when Chris no longer feels worried.

You start the story when Chris first notices his fitness declining.

Story 4 – Stephen

Stephen couldn't drive anymore due to pains in his neck and shoulder. Stephen became increasingly reliant on his wife to drive him around. Stephen felt upset about this as he had always valued his independence.

The story ends when Stephen no longer feels upset.

You begin the story when Stephen starts to feel increasingly reliant on his wife.

Appendix 5 - Feared-for self interview

This section is concerned with how you see yourself in the future. We all think about the future to some extent. When we do this we usually think about the kinds of experiences that are in store for us and the kinds of people we might possibly become. We may have images of ourselves that we fear, dread or don't want to happen. Examples of common feared-for selves are getting divorced, becoming ill, having financial problems or becoming bitter, resentful or unkind. Some of us may have a large number of feared possible selves in mind, whereas others may have only a few.

You have been given a set of cards. Written on each card is a characteristic that people with chronic pain have told us they might fear becoming in the future. Some of these may apply to you and some may not. There may be other things that you fear for that are not written on the cards. You can add any of your own by writing them on one of the blank cards. I would like you to choose up to ten characteristics that apply to you and put these cards in a separate pile. Let me know when you have finished.

Now that you have identified some of your feared-for characteristics I am going to ask you two questions about each of these characteristics:

1. Is it possible to be like this without pain? Please give a yes or no response
2. How close do you currently feel you are to this characteristic?
Please indicate on the scale how close you currently feel to this characteristic.

1	2	3	4	5	6	7
I am just like						I am the complete
This now						opposite to this

E.g. Is it possible to be unkind without pain?

Now, thinking about the feared-for characteristics you have chosen overall:

1. How likely is it that these characteristics will describe you in the future
Please indicate on the scale how likely you feel it is.
2. How capable do you feel of preventing these descriptions from becoming true?
Please indicate on the scale how capable you feel of preventing them becoming true.

Feared-for self interview response sheet

Feared-for selves	Is it possible to be like this without pain? (yes/no)	How close am I currently to this characteristic? (1-7)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

How likely is it that these characteristics will describe you in the future? (1-7)

1	2	3	4	5	6	7
Very						Very
Unlikely						Likely

How capable do you feel of preventing these descriptions coming true? (1-7)

1	2	3	4	5	6	7
Not at all						Definitely

Appendix 6 – Hoped-for self interview

Now let's think about the future in terms of hoped for selves. We may have images of ourselves and what we hope we will be like. Examples of common hoped for selves are becoming a parent or grandparent. Some of us may have a large number of hoped for possible selves in mind, whereas others may have only a few.

You have been given a set of cards. Written on each card is a characteristic that people with chronic pain have told us they hope to become in the future. Some of these may apply to you and some may not. There may be other things that you hope for that are not written on the cards. You can add any of your own by writing them on one of the blank cards. I would like you to choose up to ten characteristics that apply to you and put these cards in a separate pile. Let me know when you have finished.

Now that you have identified some of your hoped-for characteristics I am going to ask you two questions about each of these characteristics:

- 1) Could you be like this with pain? Please give a yes or no response
- 2) How close do you currently feel you are to this characteristic?
Please indicate on the scale how close you currently feel to this characteristic.

1	2	3	4	5	6	7
I am just like						I am the complete
This now						opposite to this

Now, thinking about the Hoped-for characteristics you have chosen overall:

- 1) How likely is it that these characteristics will describe you in the future
Please indicate on the scale.
- 2) How capable do you feel of making these characteristics happen in the future?
Please indicate on the scale capable of becoming these you are.

Personal Problem solving task

Instructions: If the participant identifies pain-self enmeshed characteristics administer the personal problem solving task. If more than 3 characteristics are identified ask the participant to choose the 3 which are most important to them.

Participant's instructions: Now, for the characteristics you answered "No I cannot be like this in pain" I would like to ask you a question.

- 1) "Can you think of a way of achieving this characteristic despite the pain?"

Hoped-for self interview response sheet

Hoped-for self	Could you be like this if you were still in pain (yes/no)	How close am I currently to this characteristic? (1-7)	Personal Problem Solving “Can you think of a way of achieving this characteristic despite the pain?”
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

How likely is it that these characteristics will describe you in the future? (1-7)

1	2	3	4	5	6	7
Very						Very
Unlikely						Likely

How capable do you feel of making these characteristics happen in the future? (1-7)

1	2	3	4	5	6	7
Not at all						Definitely

Appendix 7 – Participant information sheet and consent form

PARTICIPANT INFORMATION SHEET **Research into problem solving and chronic pain.**

Introduction

You are being invited to take part in a research study about chronic pain. This piece of research is being conducted by Stephen Donaldson, a Psychologist in Clinical Training, as part of his research degree at The University of Leeds. To conduct this research I need volunteers who are attending the pain clinic. It is important that you read the following information before making your decision. Discuss it with others if you wish.

What is the purpose of this study?

The study aims to investigate the different approaches people take to coping with chronic pain. I am particularly interested in how people with chronic pain think about their future and how this is related to the way they solve problems.

What will happen if I decide to take part?

If you decide to take part an interview will be arranged, either at the clinic or in your own home if more convenient. The session will involve filling in brief questionnaires that ask about your current mood and how you cope with your pain. You will also be asked to think about some of your fears and worries about the future, as well as some of your hopes and aspirations.

The session will also involve participating in a task which looks at problem solving. This involves listening to some short stories which pose a problem. You will be asked to provide a potential solution to these problems. You will also be asked to think about how you approach problems during the session. Your responses to this part of the interview will be tape recorded. Only the researcher and his academic supervisor will listen to your responses. The researcher will make a written summary of your responses and then the recording will be permanently erased. The written summary will be kept with the other information you provide in a locked cabinet in The University of Leeds as described below.

All of this should take around 90 minutes.

Do I have to take part?

No. It is entirely your decision whether you take part in this study. If you do decide to take part you will keep this information sheet and will be asked to sign a consent form. If you choose not to, this will not have any effect on your future treatment. Also, if you agree to take part but then change your mind, you can pull out of the study at any point and again this will not affect your future treatment.

Who will know about my taking part and what happens to the information?

A copy of the consent form will be kept in your medical file so professionals who have access to your medical file may know that you have consented to participate in this study. Any information obtained will be collected in a private room by the researcher. All the information that you provide will be treated with the strictest confidence. The only occasion when confidentiality would be broken and information passed onto a third party, would be if

you tell me that you, or somebody else had been harmed or was at risk of harm in some way. Your responses will not be shown to, or discussed, with any of the staff at the pain clinic. None of the information you provide as part of this study will have your name on it. It will all be stored in a locked cabinet at the University of Leeds.

Can I get further information?

If you would like any more information before making your decision, please speak to Stephen Donaldson. I will be at the clinic on various occasions. Please come and talk to me about the study. You can also call me on **xxxxxxx**. You will be asked to leave your name and a contact number and I will return your call.

Thank you

CONSENT FORM**Research into problem solving and chronic pain.**

Chief Investigator: Stephen Donaldson
 Supervisor: Stephen Morley

Please initial
box

1. I confirm that I have read and understand the information sheet about this research. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care being affected. ☐
3. I understand that data collected during the study, may be looked at by individuals from The University of Leeds, from regulatory authorities, or from the NHS Trust. I give permission for these individuals to have access to my anonymised data. ☐
4. I agree to my responses to the problem-solving tasks being recorded. I understand that this recording will only be listened to by the chief investigator and his supervisor. ☐
5. I agree to take part in the above study. ☐

 Name of Participant

 Date

 Signature

 Name of Person
 taking consent

 Date

 Signature

When completed, 1 for participant; 1 for researchers file; 1 (original) to be kept in medical notes.